US005416948A

United States Patent [19]

Wörwag

[11] Patent Number: 5,416,948

[45] Date of Patent: May 23, 1995

[54] **VACUUM CLEANING TOOL FOR WET AND DRY VACUUM CLEANERS**

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[73] Assignee: **Firma Fedag**, Romanshorn, Switzerland

[21] Appl. No.: **19,473**

[22] Filed: **Feb. 18, 1993**

[30] **Foreign Application Priority Data**

Feb. 18, 1992 [DE] Germany 42 04 749.8

[51] **Int. Cl.**[6] **A47L 5/30**

[52] **U.S. Cl.** **15/331**; 15/387; 15/416

[58] **Field of Search** 15/387, 416, 331

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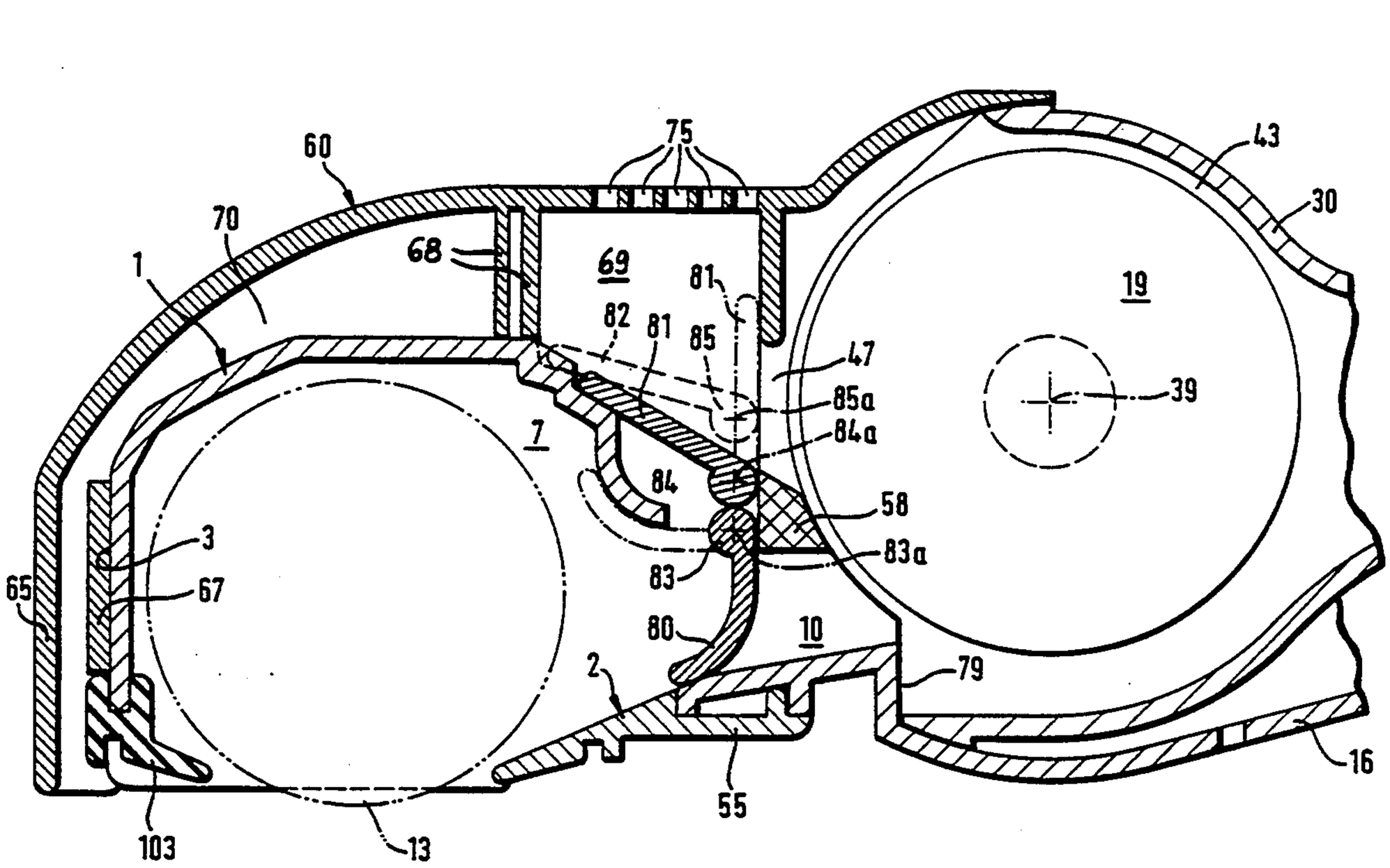
Primary Examiner—Christopher K. Moore
Attorney, Agent, or Firm—Robert W. Becker & Associates

[57] **ABSTRACT**

A vacuum cleaning tool comprising a housing having a base that is provided with at least one intake opening over which is provided a brush chamber in which is disposed a brush roller having bristles that project into the intake opening. A flow channel connects the brush chamber to a connector that can communicate with a vacuum line of a vacuum cleaning unit. A turbine chamber is disposed in the flow channel and accommodates an air turbine that can rotatably drive the brush roller. The housing also has a wet intake opening that is disposed approximately in the plane of the base of the housing. Parallel to the brush chamber and the flow channel, the housing has a wet intake channel that connects the wet intake opening to the connector. Respective controllable flow blocking devices are disposed in the wet intake channel and in the flow channel.

17 Claims, 12 Drawing Sheets



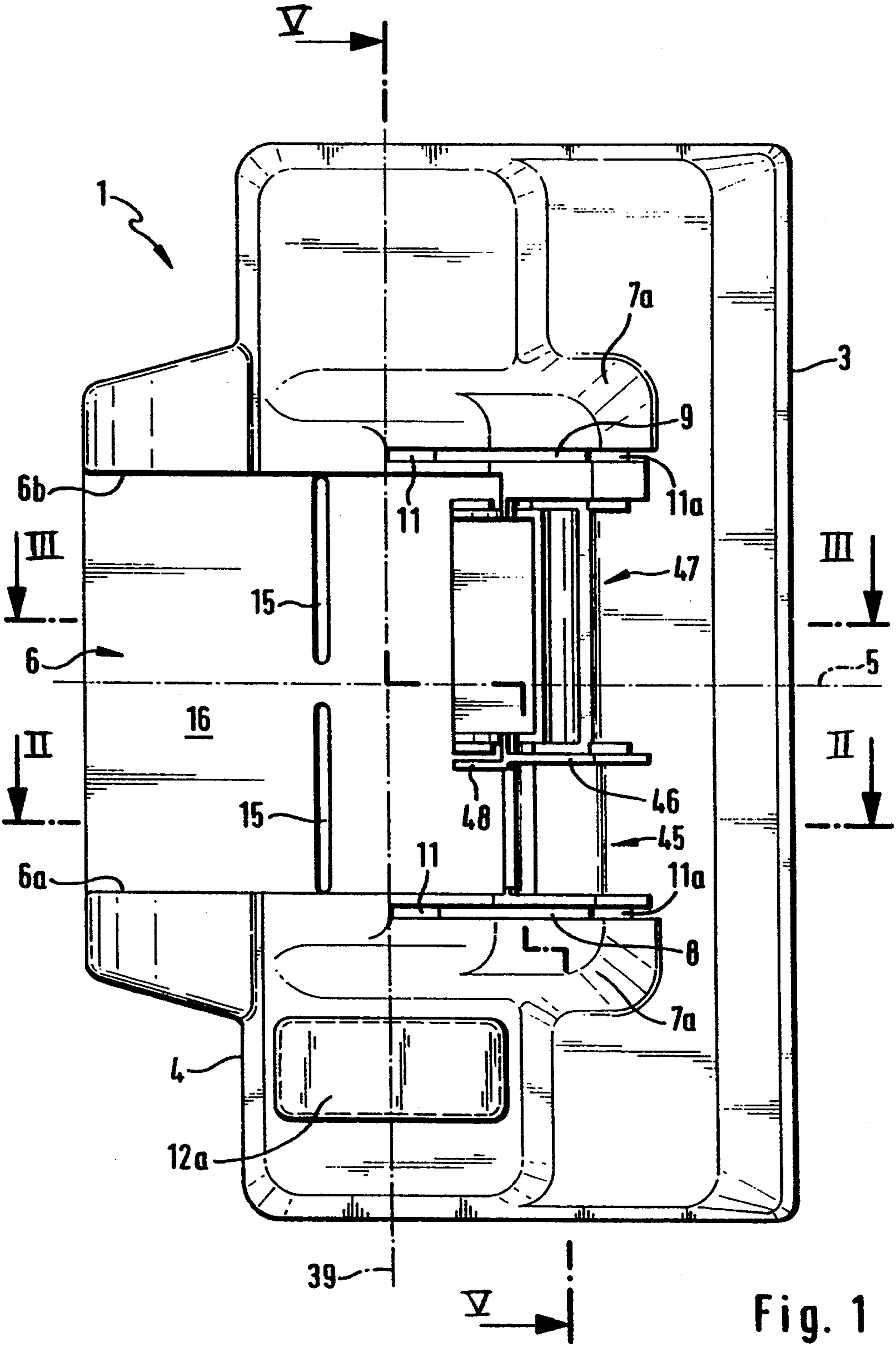

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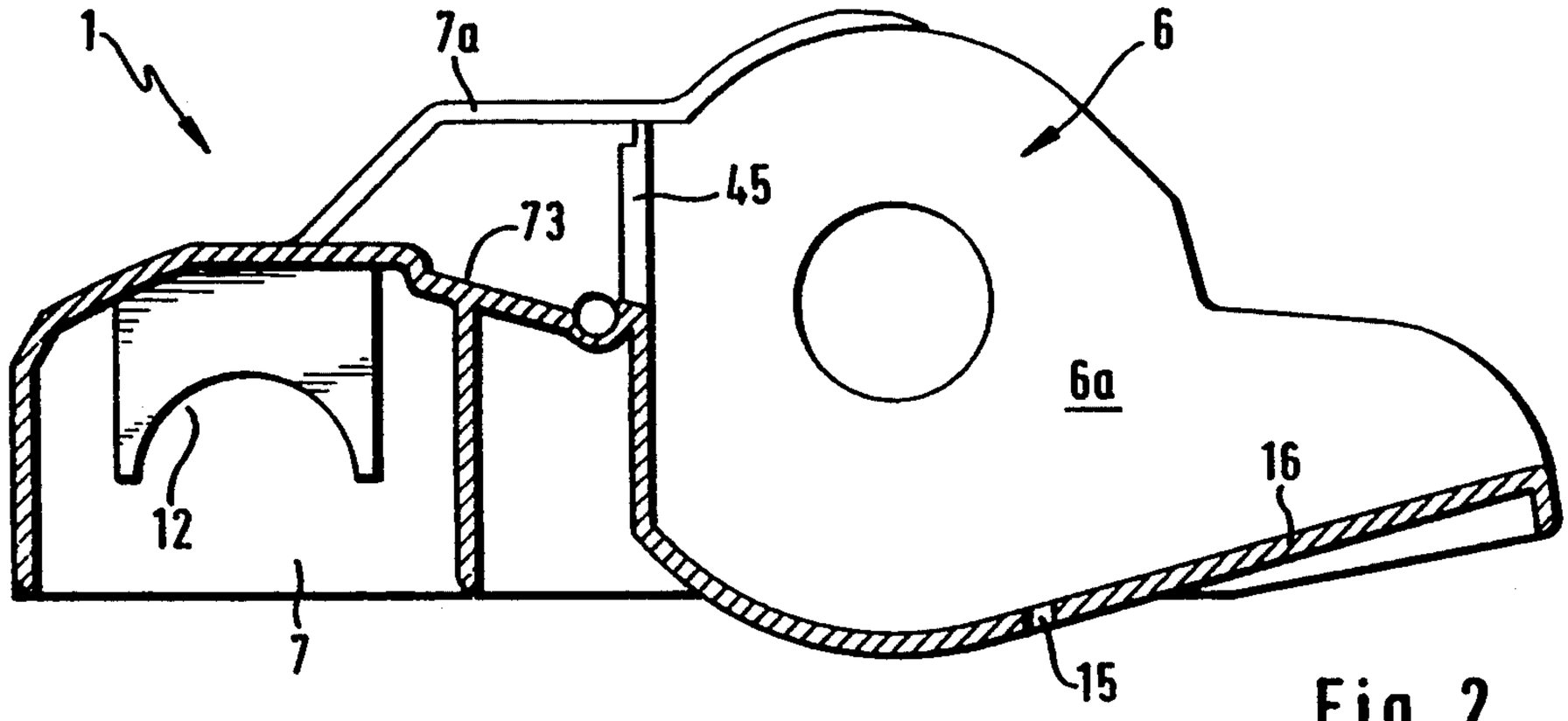
Fig. 1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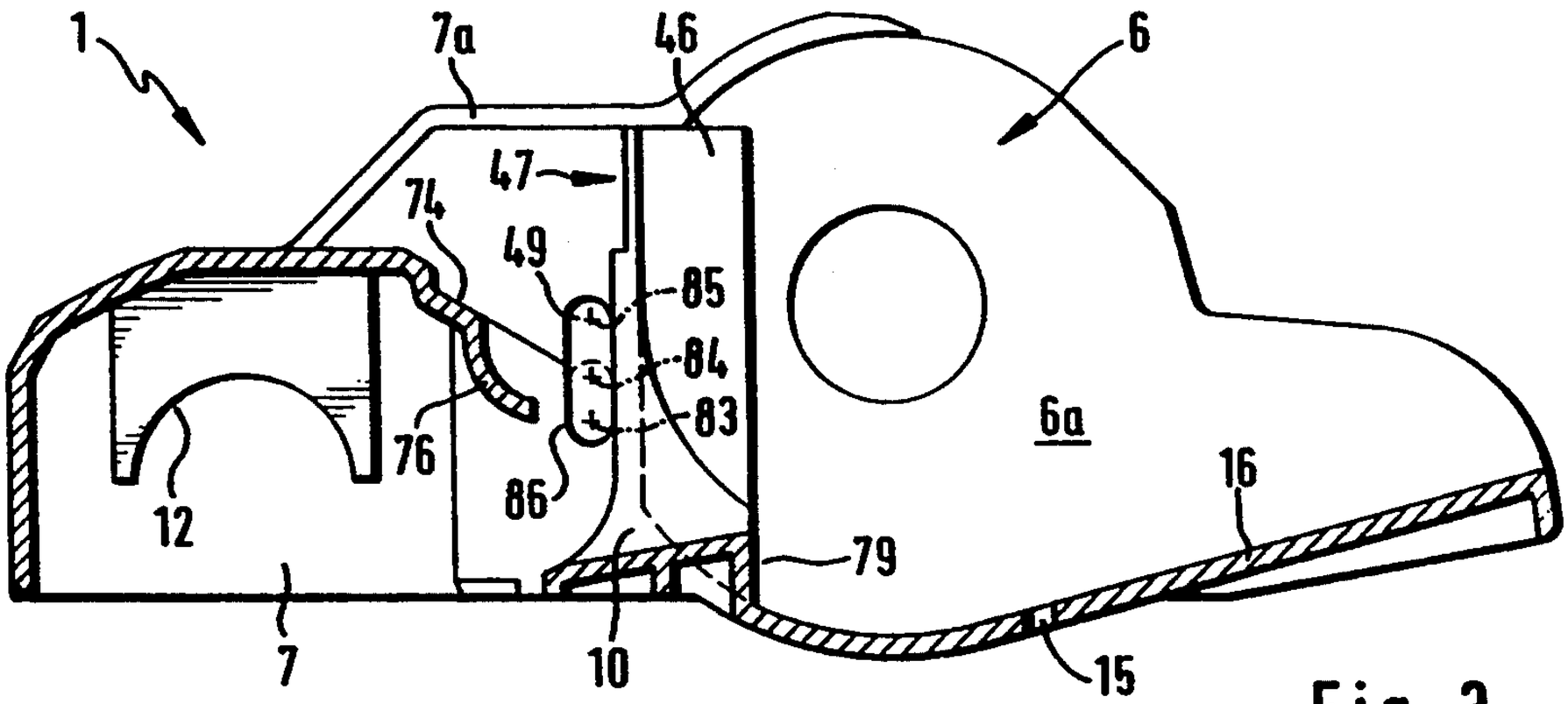
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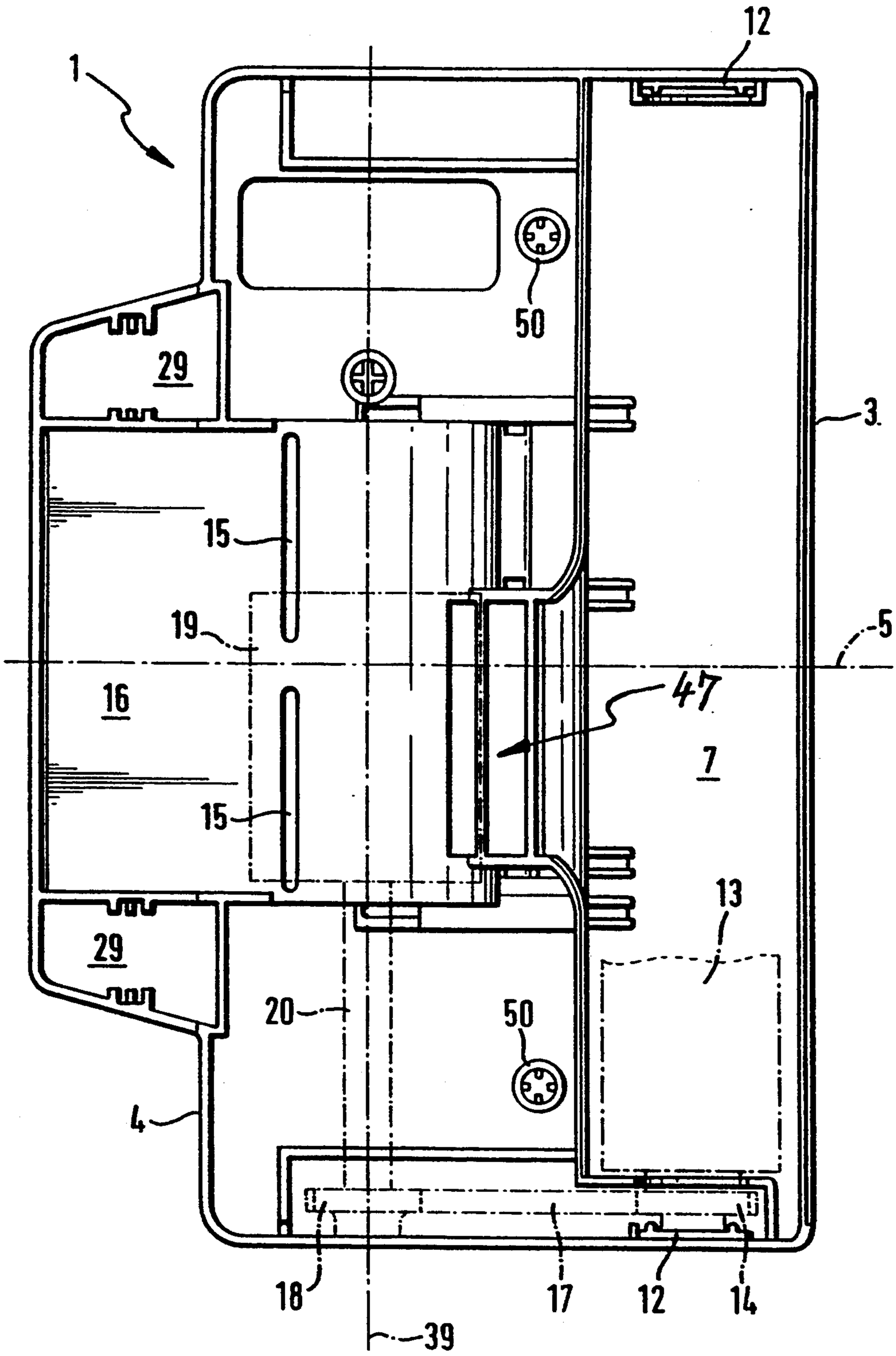

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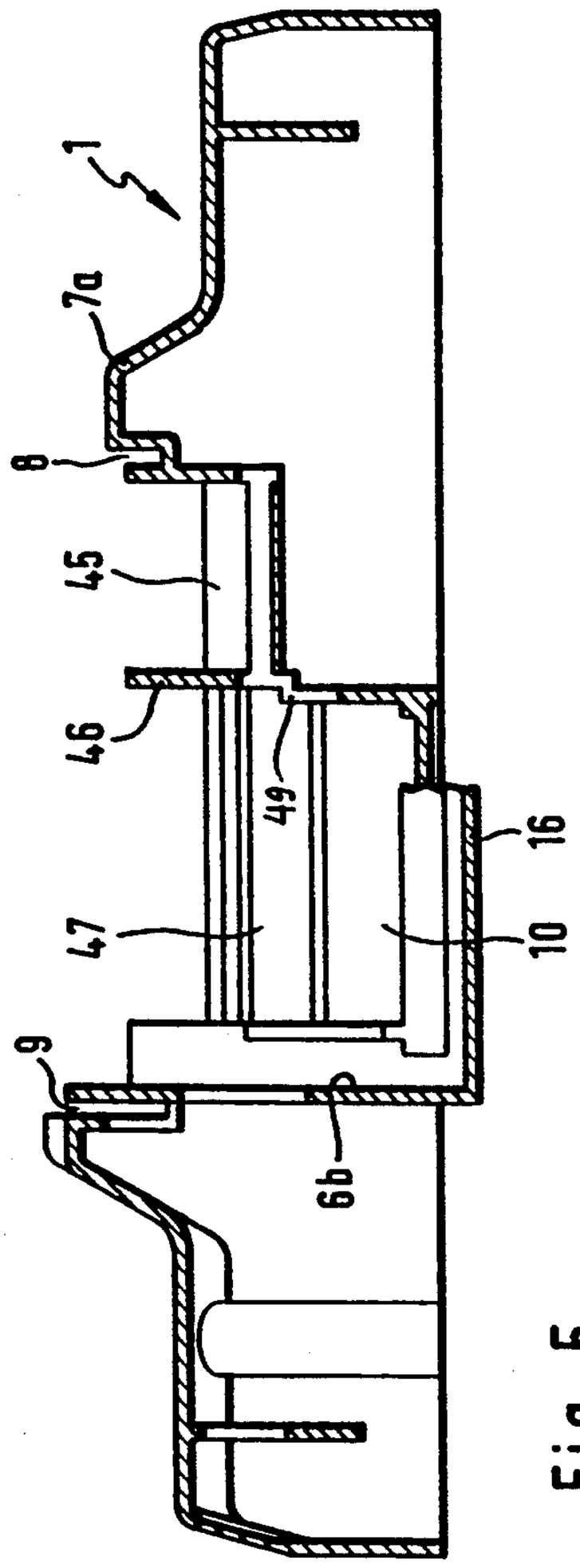

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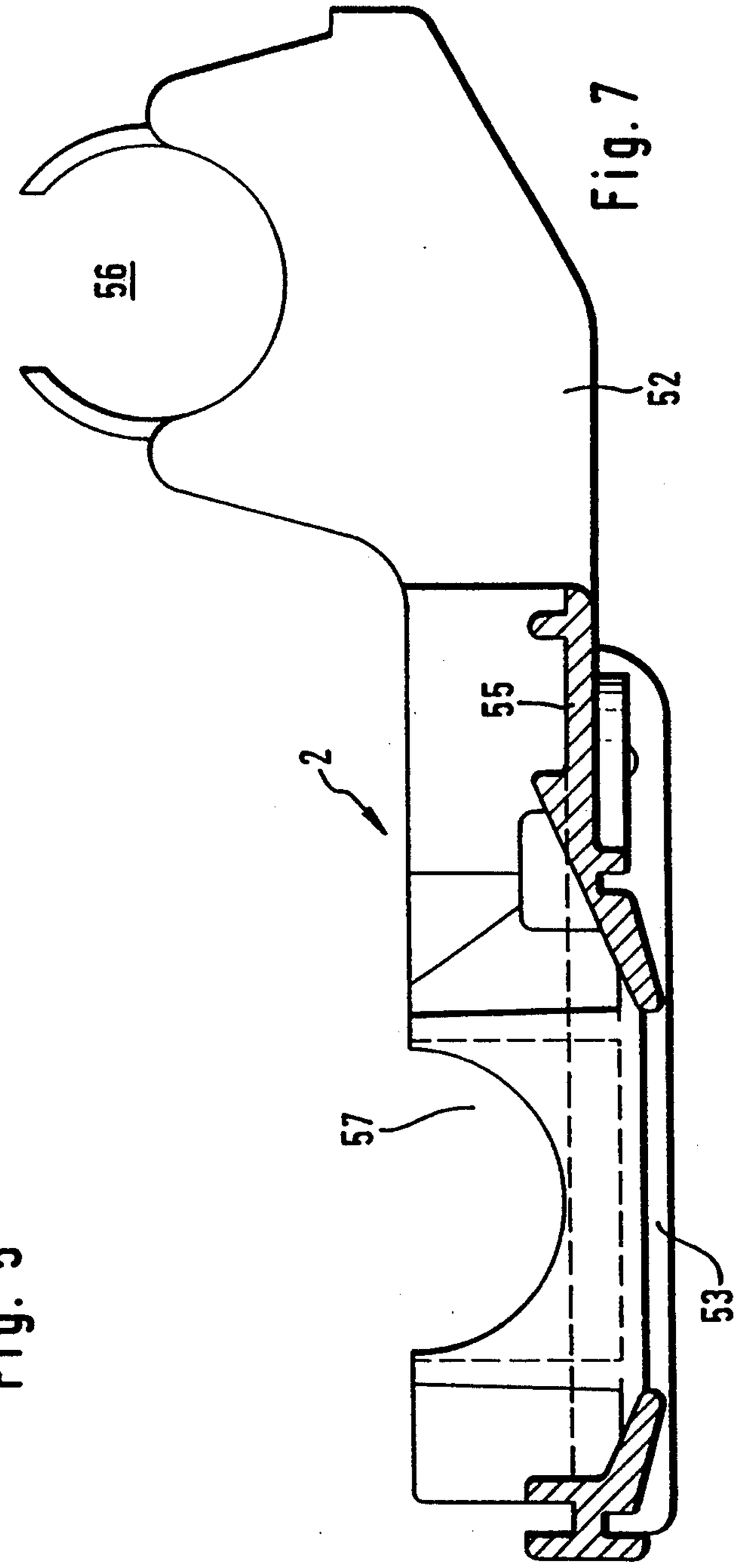

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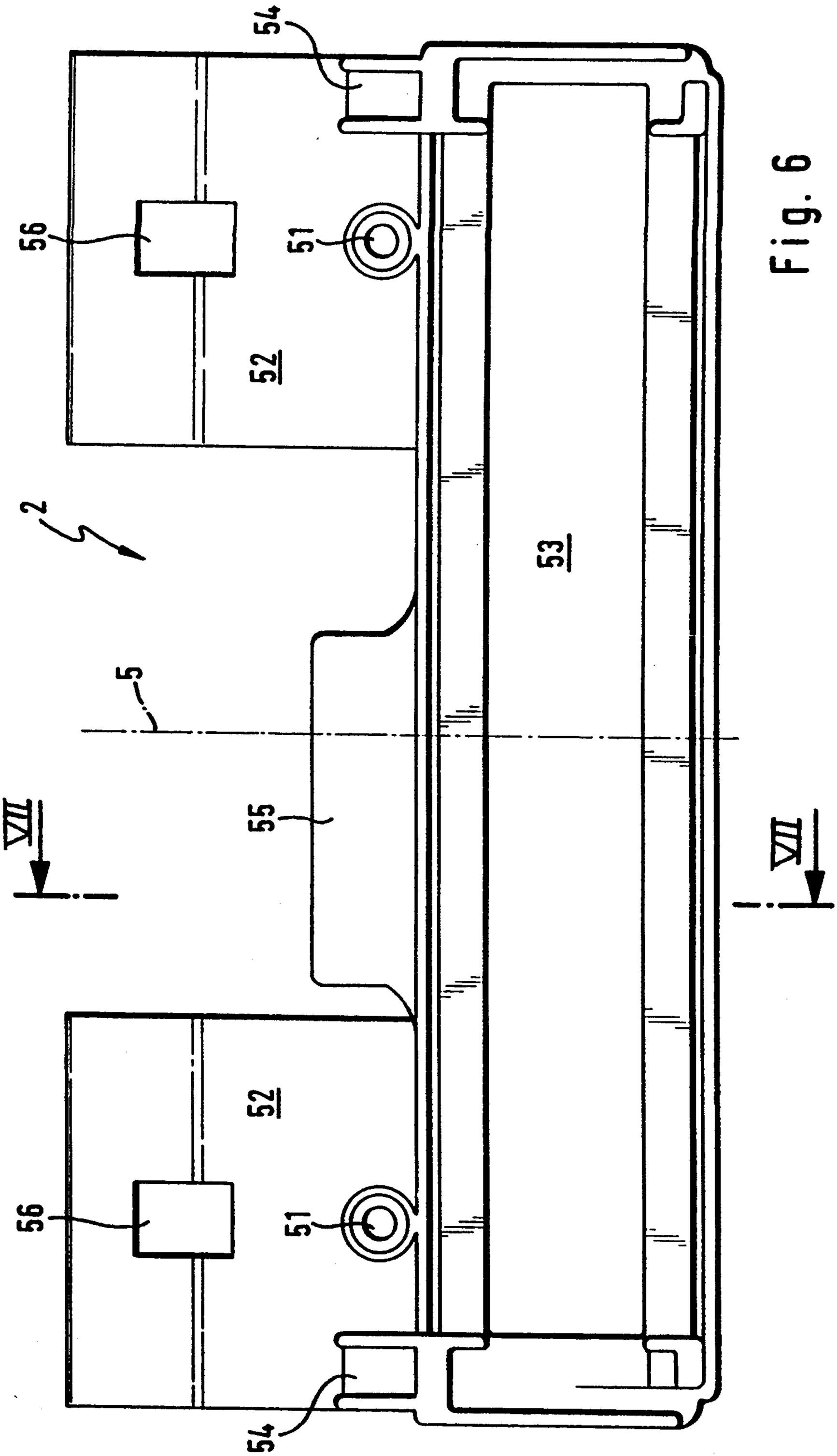

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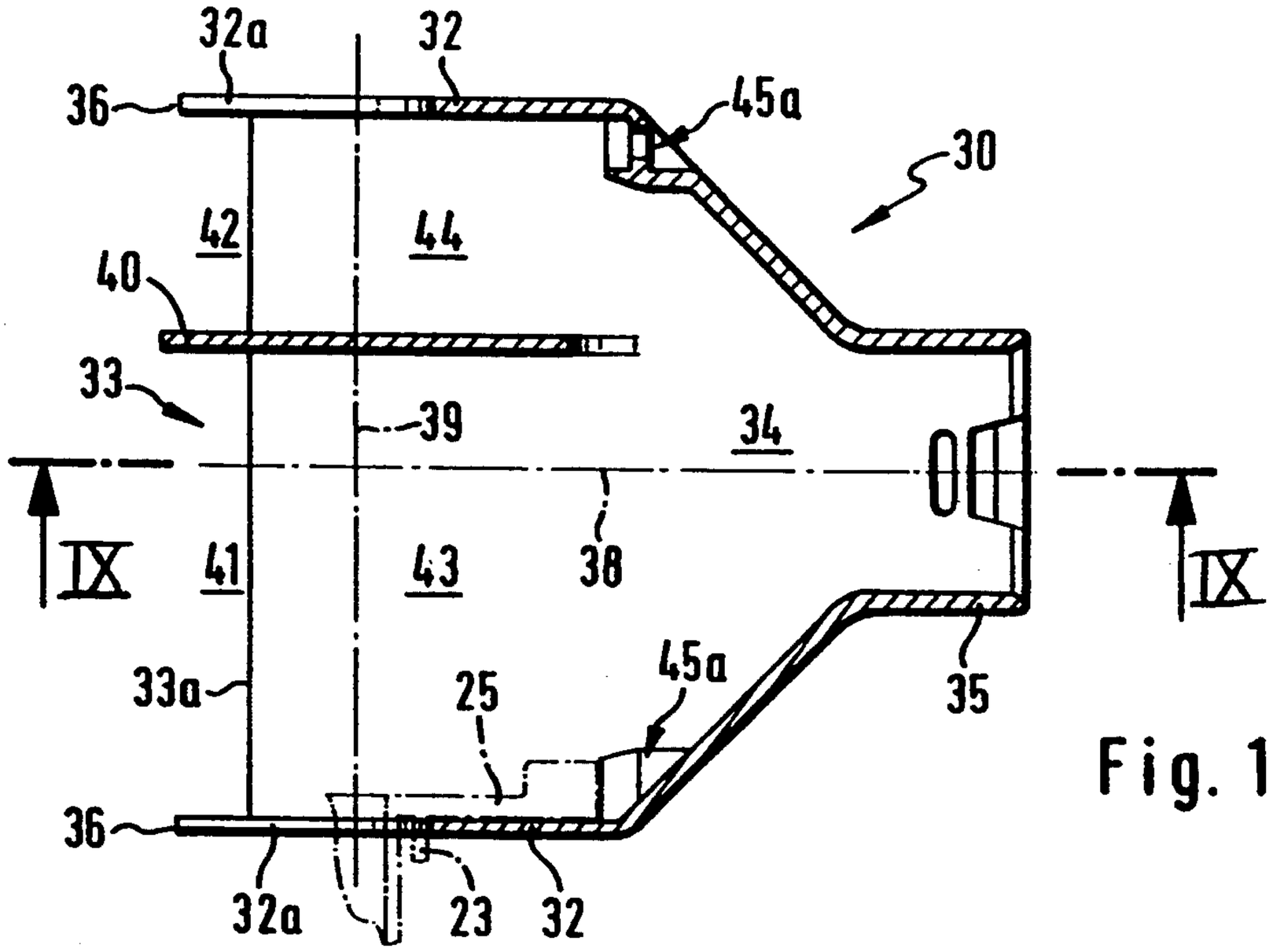

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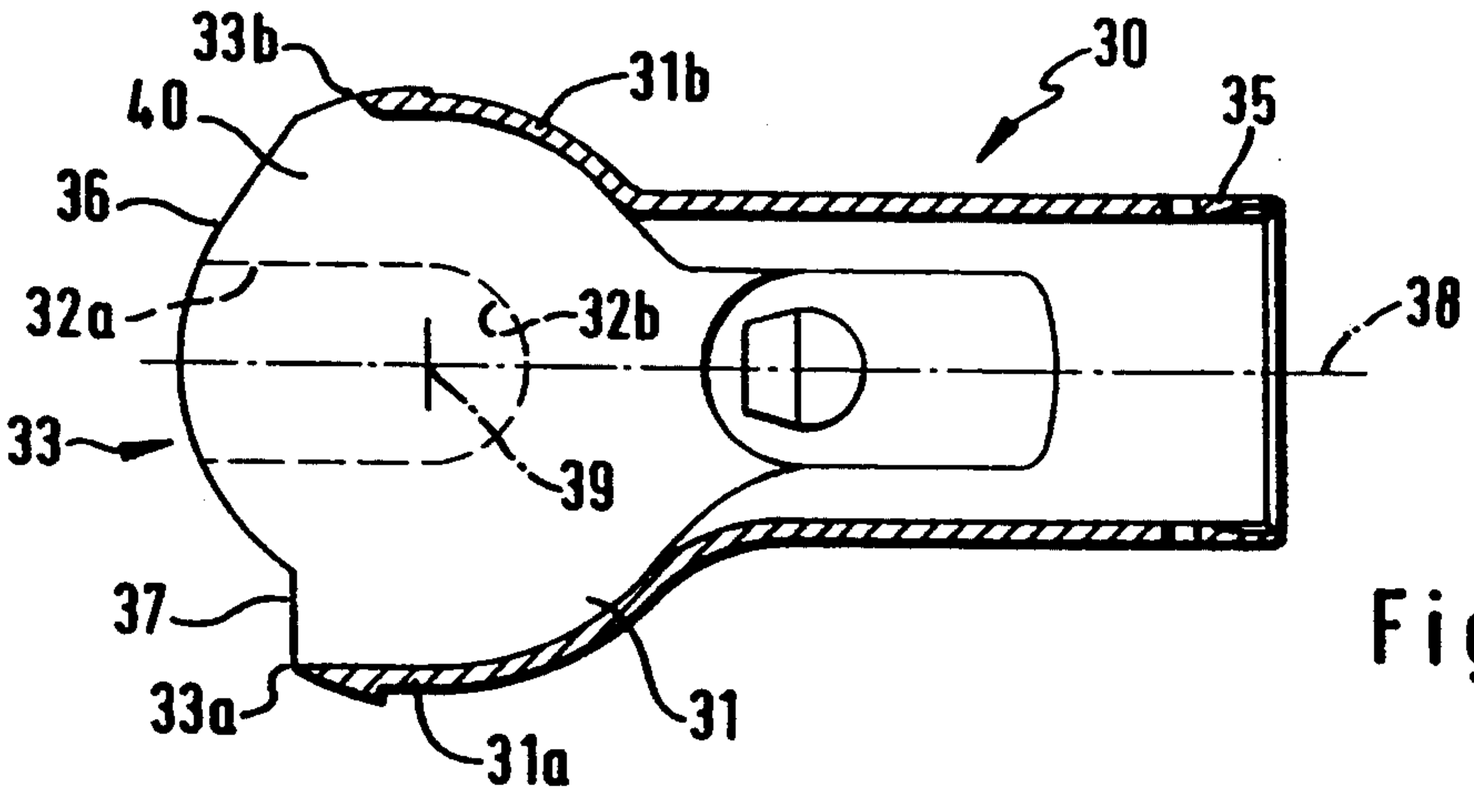

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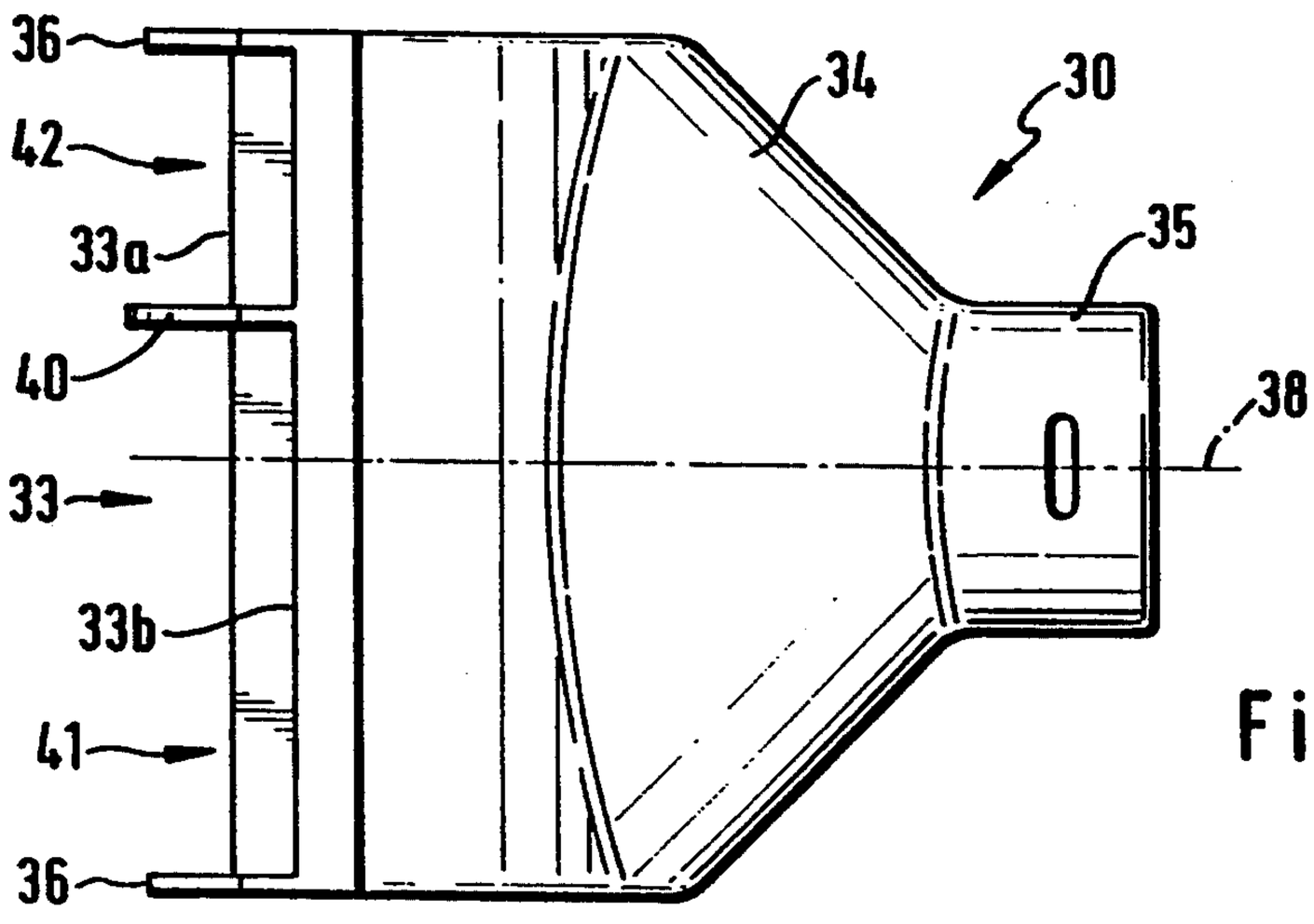

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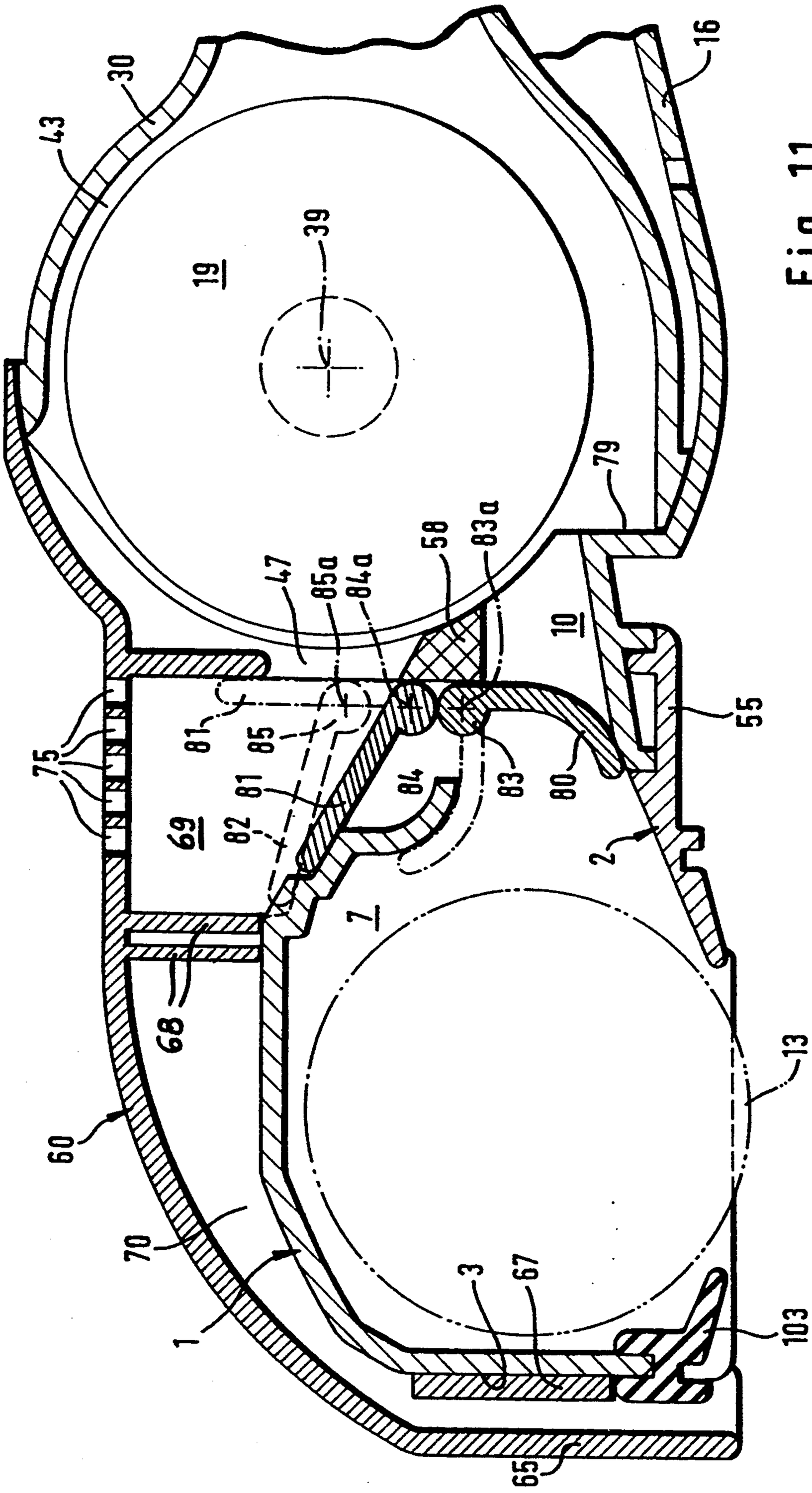
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Fig. 11

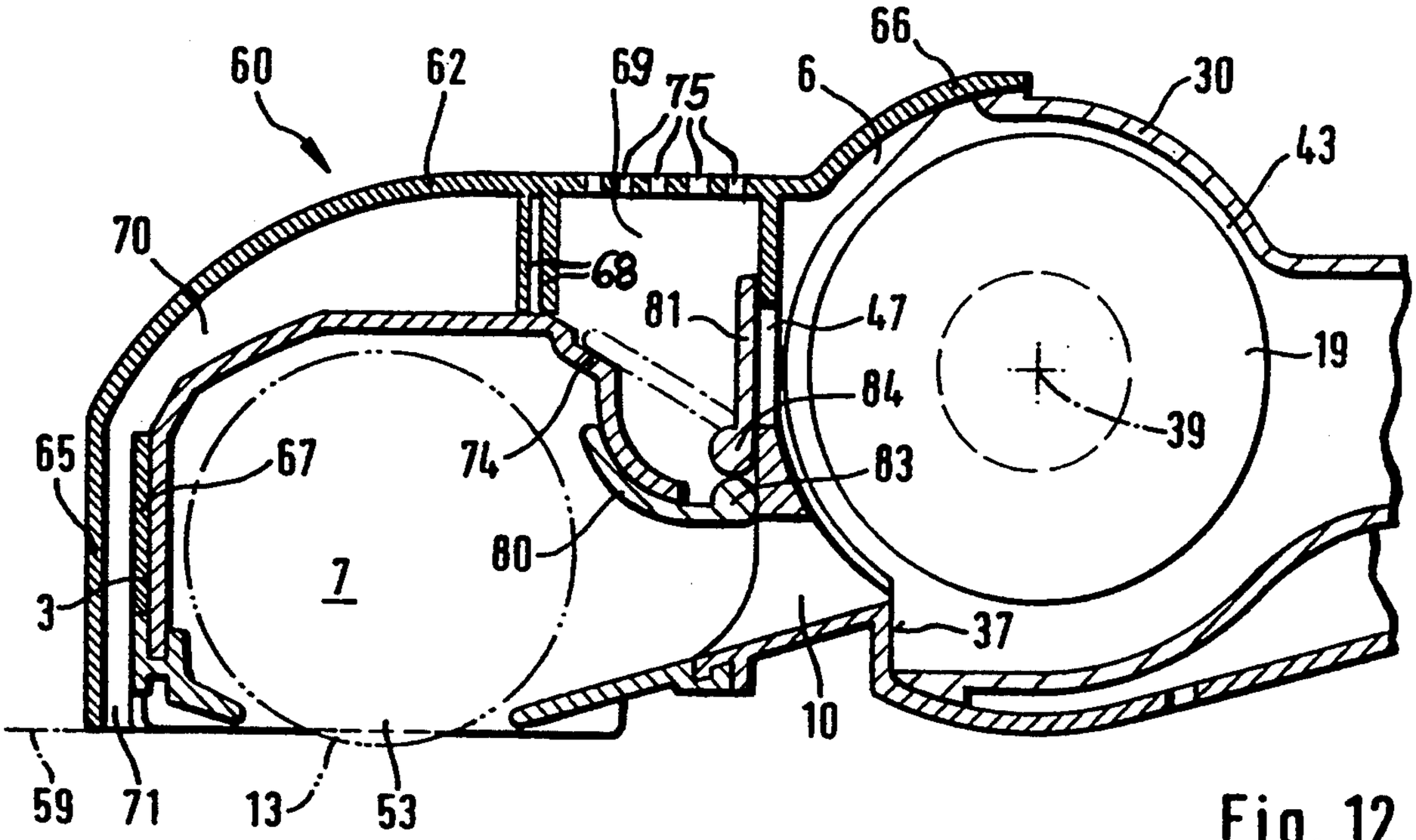
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Fig. 12

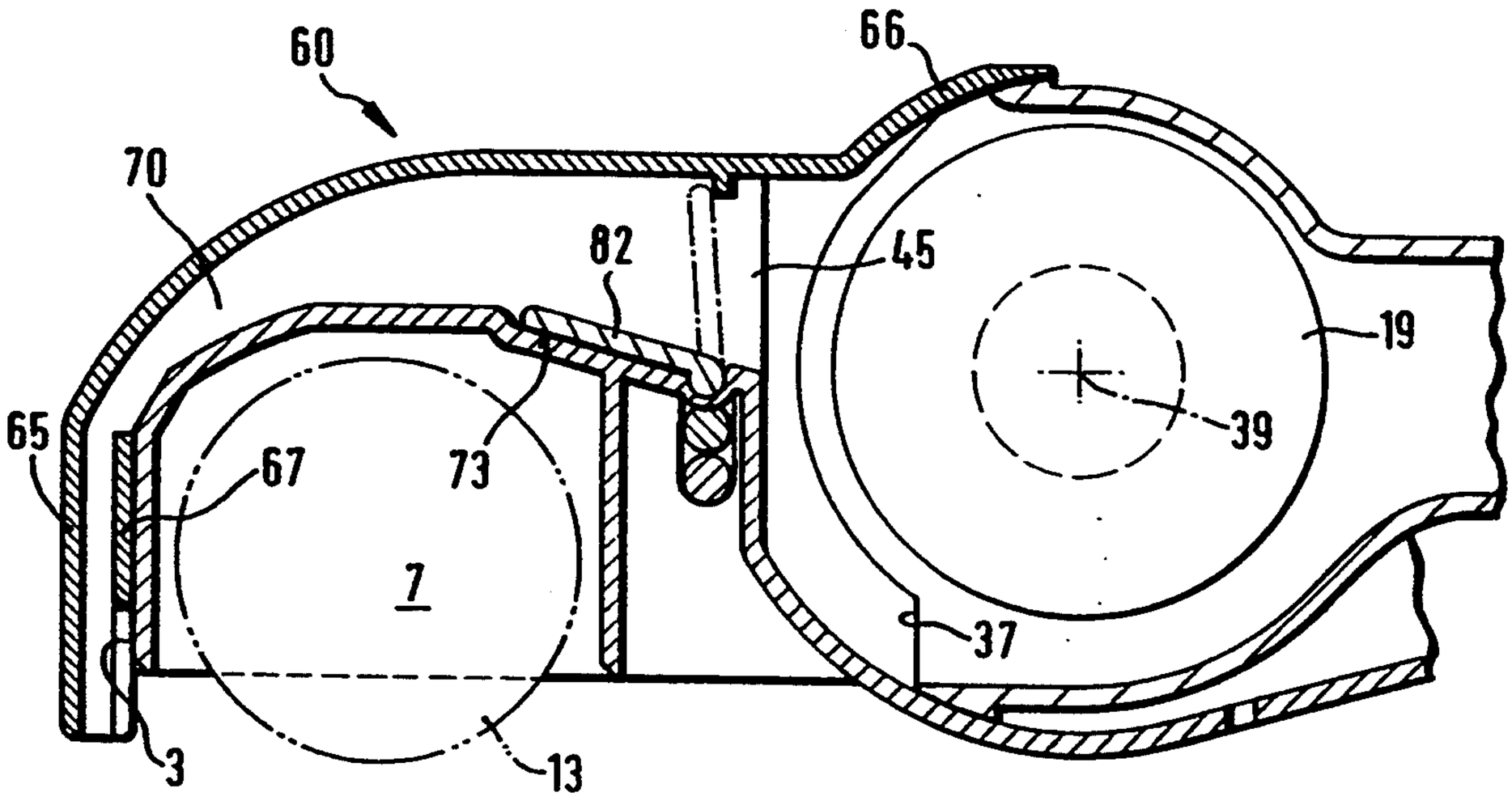
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Fig. 13

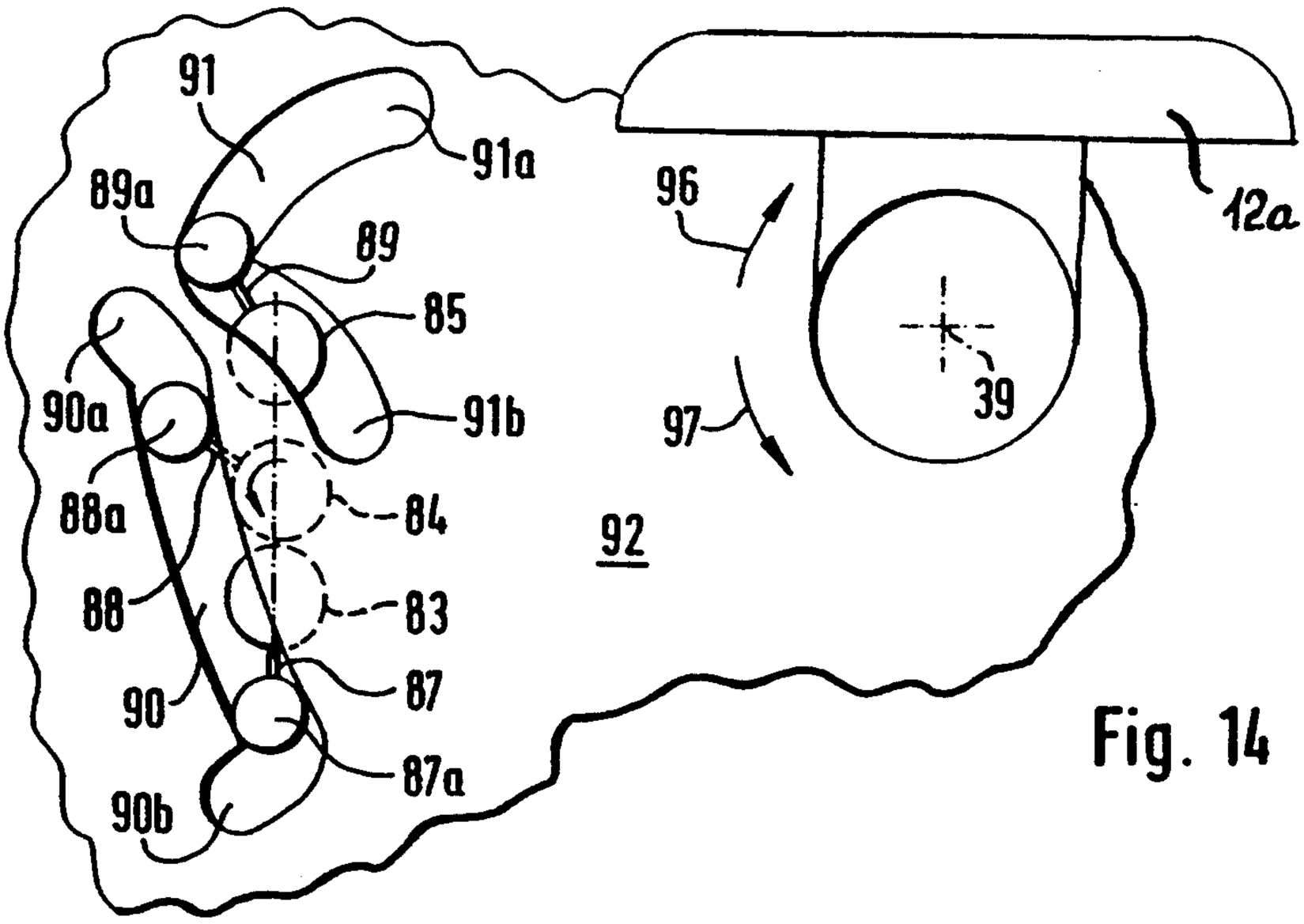


Fig. 14

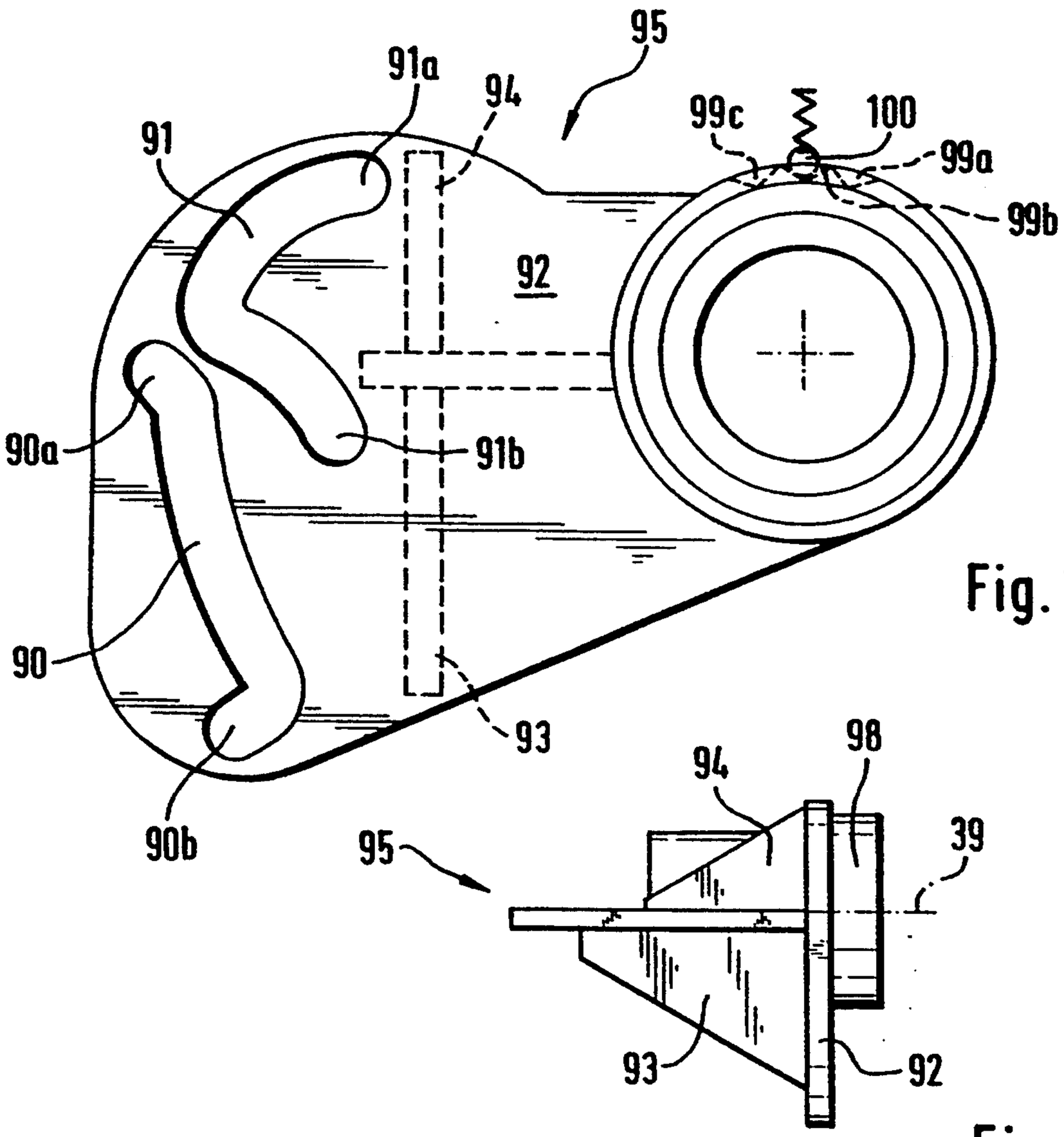
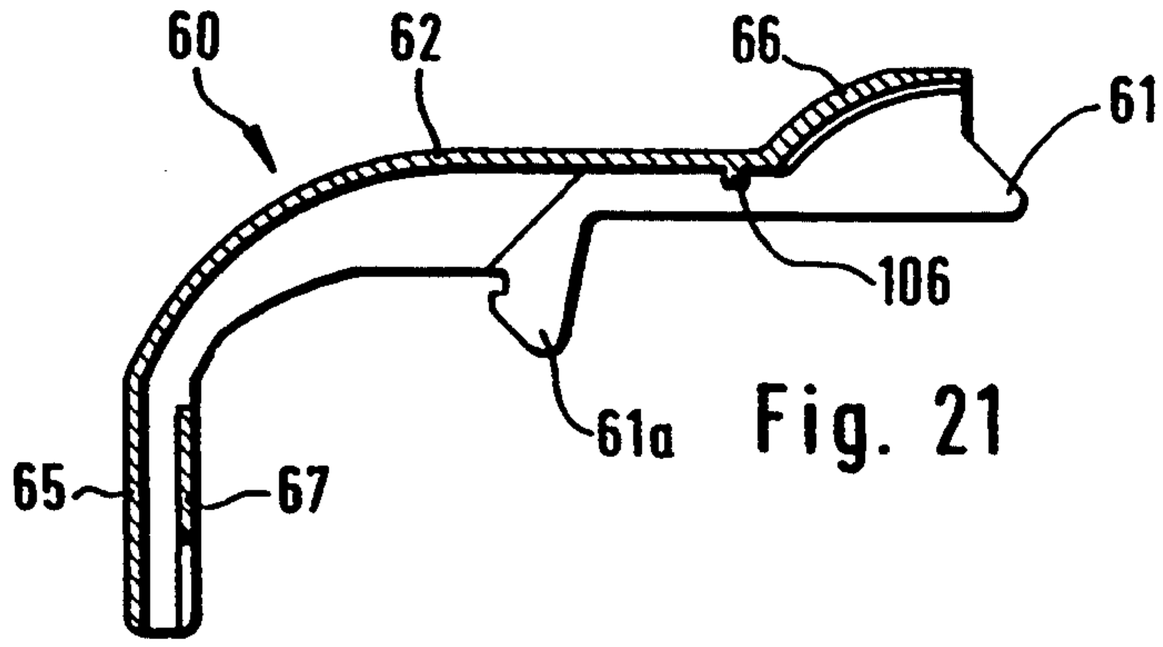


Fig. 15

Fig. 16



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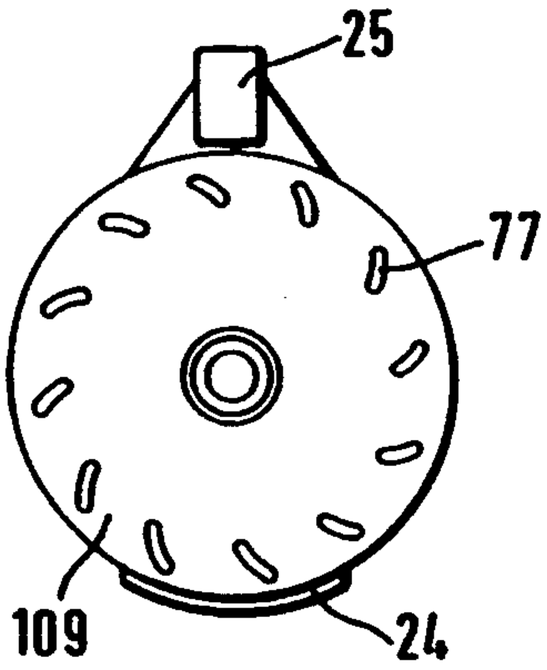

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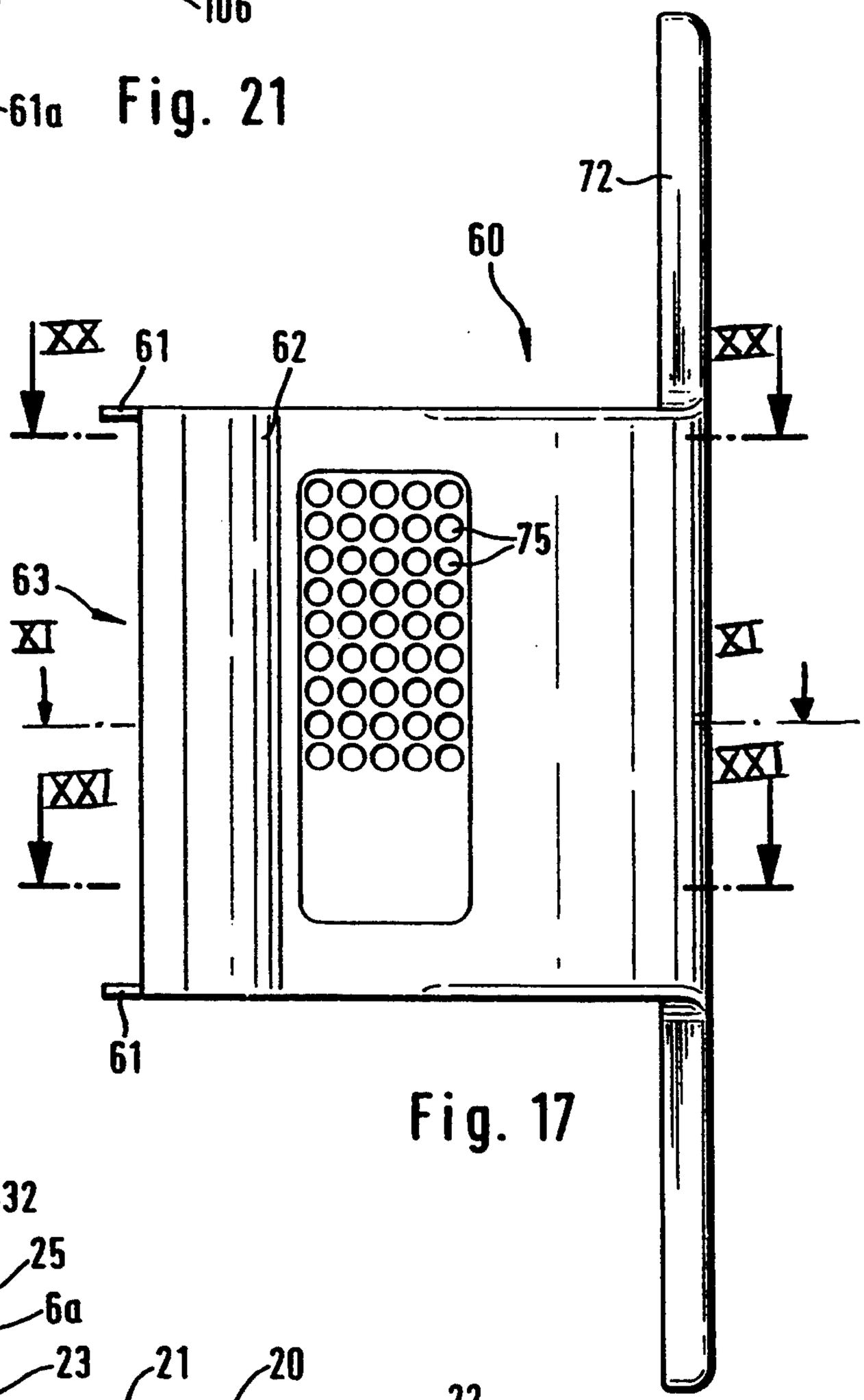

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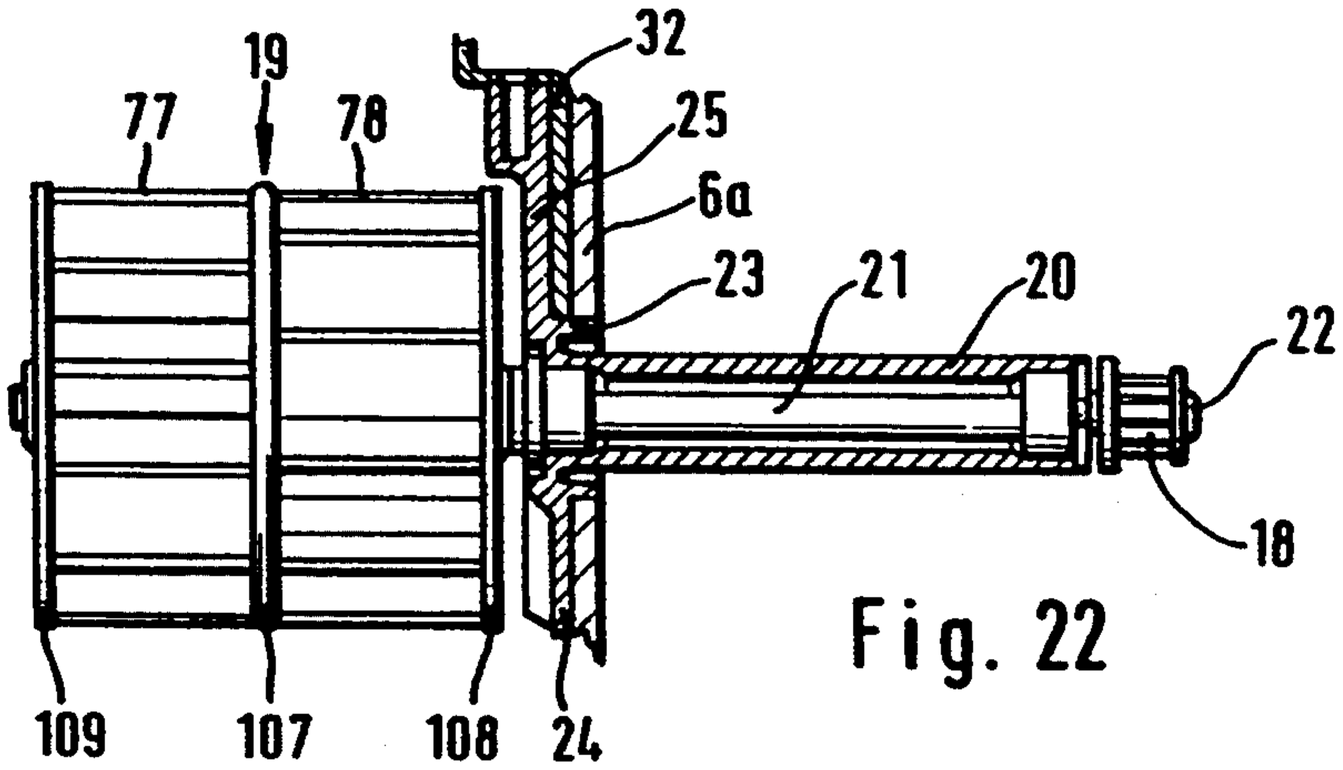

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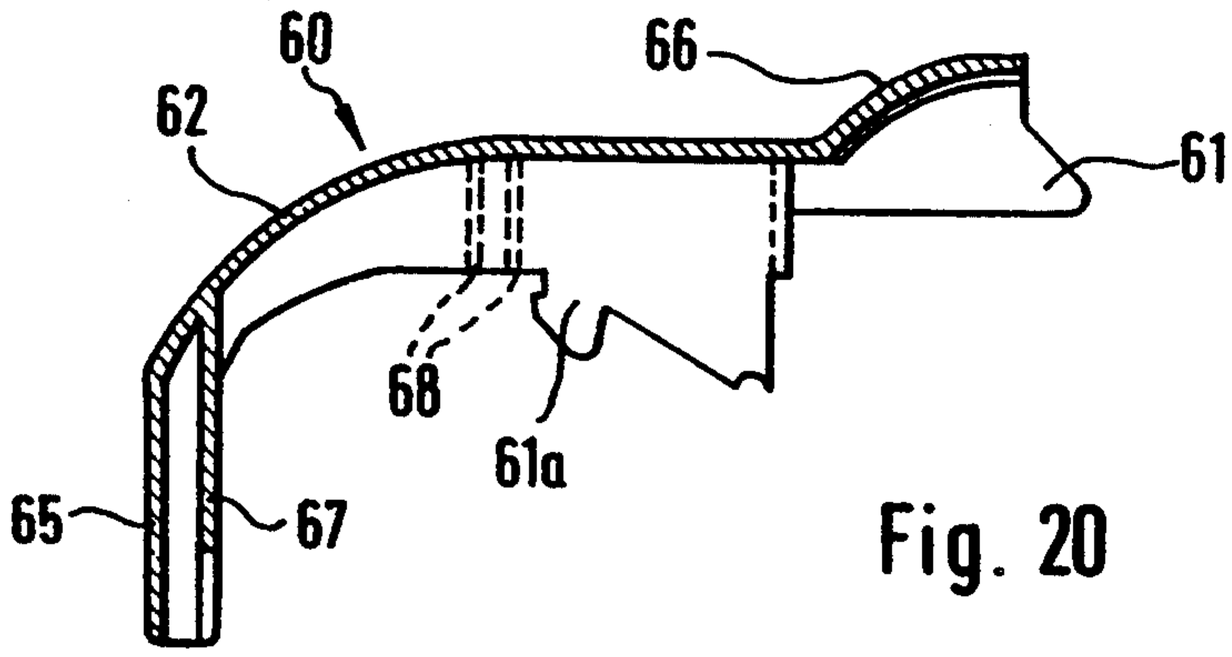

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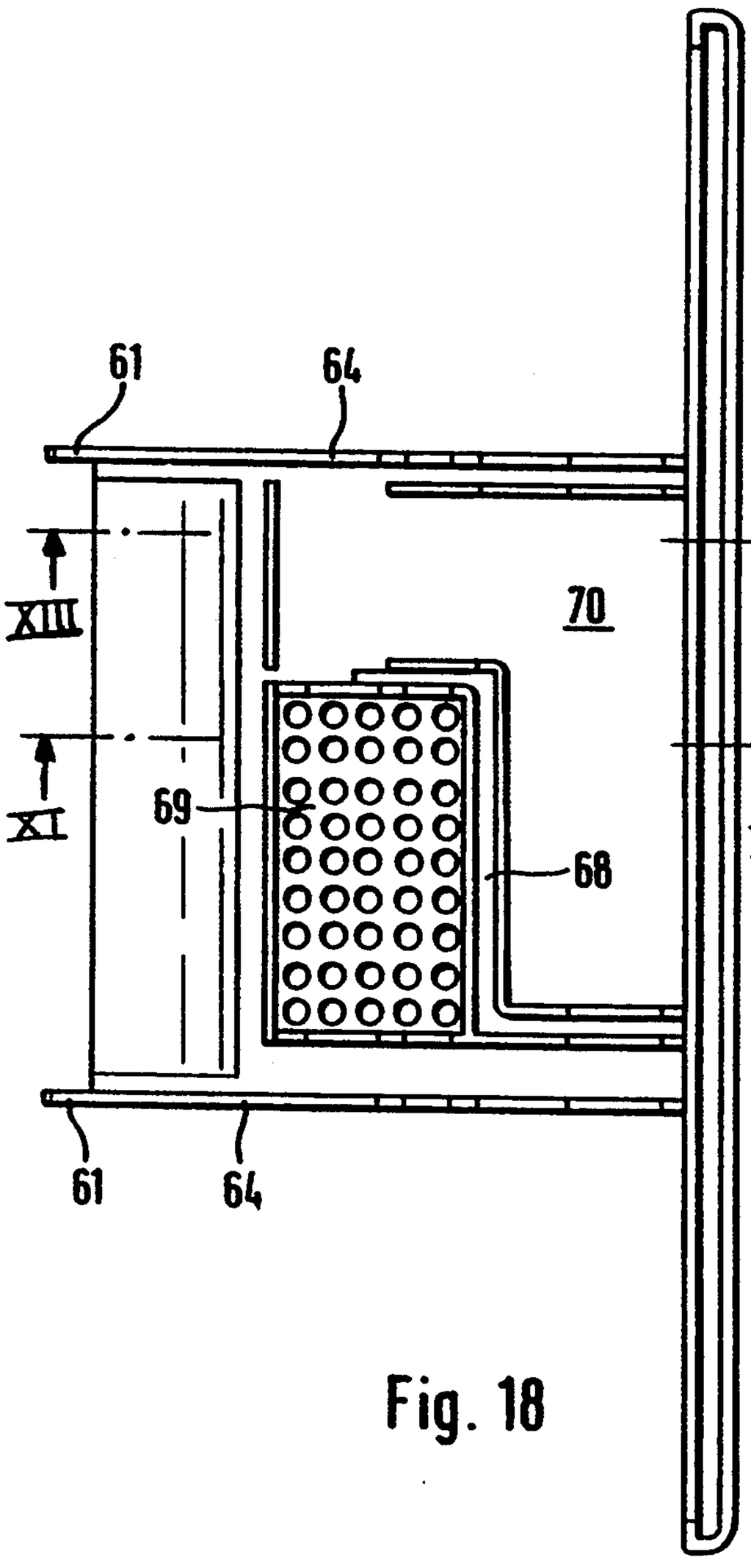

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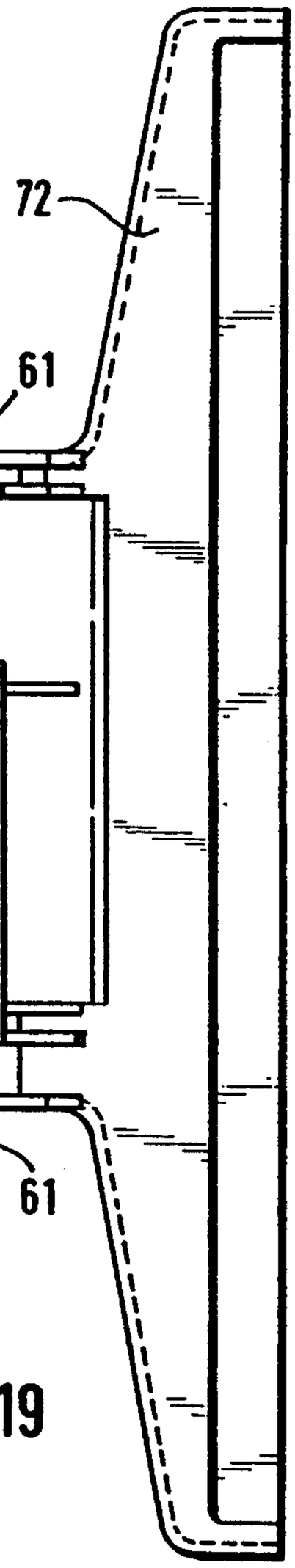
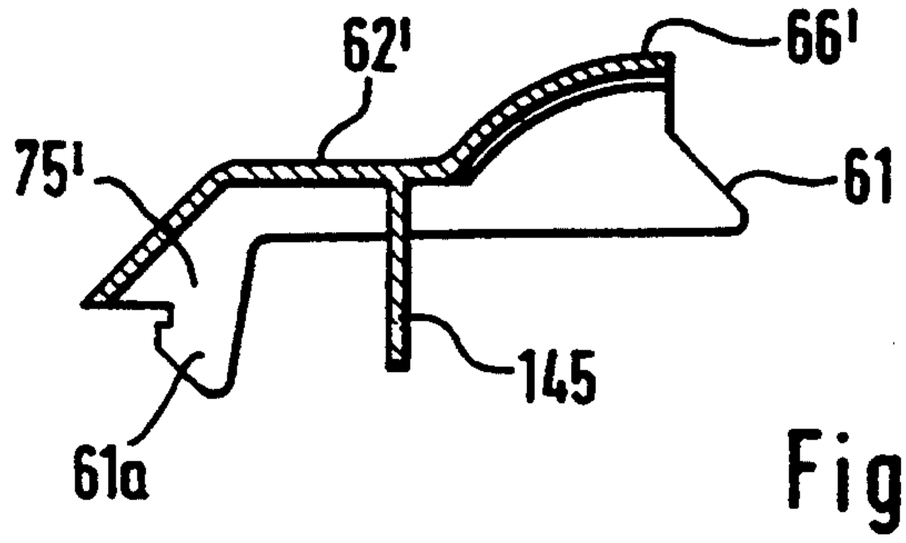


Fig. 19



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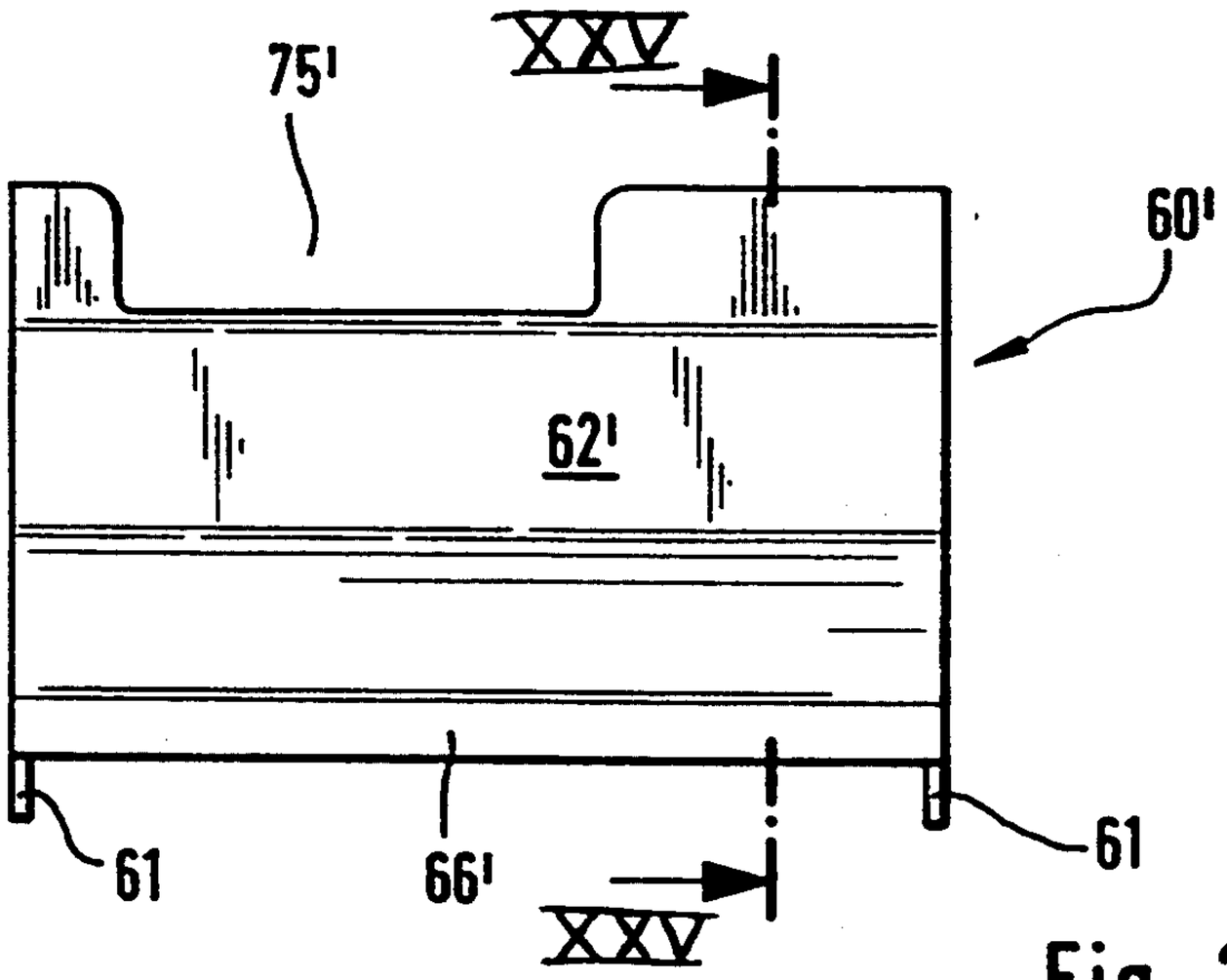

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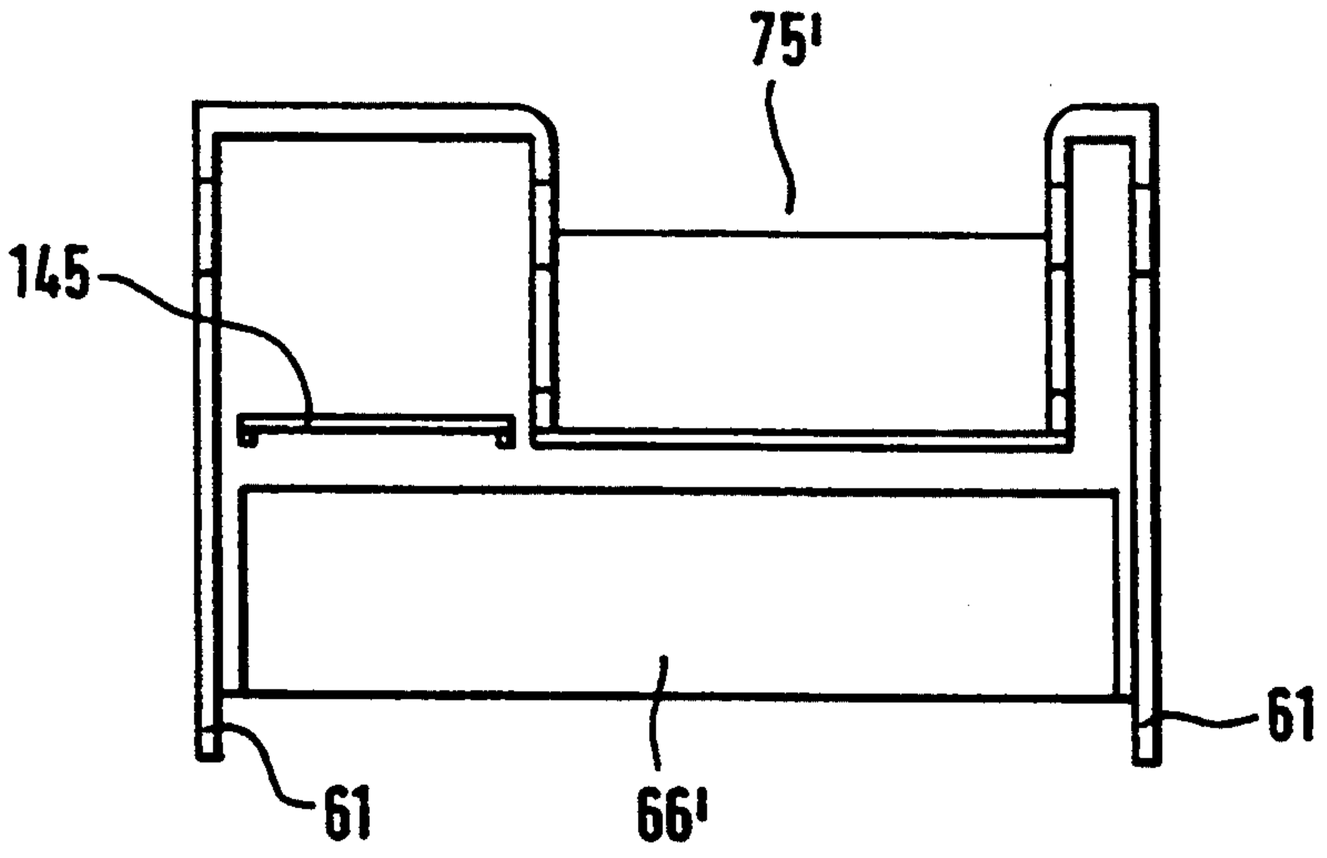

Fig. 26

VACUUM CLEANING TOOL FOR WET AND DRY VACUUM CLEANERS

BACKGROUND OF THE INVENTION

The present invention relates to a vacuum cleaning tool.

When cleaning floor coverings, especially textile floor coverings, wet cleaning is indispensible. Initially, the coarse dust is vacuumed up; this is preferably carried out with a brush roller that rotates in the intake air stream. Thereafter, cleaning foam is applied and the floor covering is cleaned mechanically, preferably with a brush that merely rotates. Excess liquid must then be vacuumed up so that after the floor covering is dry it can again be vacuumed, possibly with brushes.

For dry vacuuming a vacuum cleaning tool such as disclosed in U.S. Pat. No. 4,426,751 is used. Such a vacuum cleaning tool has two oppositely rotating brush rollers that are disposed in a brush chamber, with respective intake air channels being tangentially disposed relative to the brush rollers. The two intake air channels open into a common connector that leads to a vacuum cleaning unit.

German Offenlegungsschrift DE 34 14 860 A1 discloses that the turbine air stream that drives the brush roller can be adjusted by a controllable flow guide.

For wet cleaning, especially for vacuuming up any excess cleaning fluid, a suitably adapted vacuum cleaning tool must be used. The vacuum cleaning tool must be changed for the respective procedure. This is laborious and time consuming, especially when only parts of a larger surface can be cleaned one after the other.

It is therefore an object of the present invention to improve a vacuum cleaning tool of the aforementioned general type in such a way that both dry and wet vacuuming procedures can be carried out without having to change the vacuum cleaning tool.

BRIEF DESCRIPTION OF THE DRAWINGS

This object, and other objects and advantages of the present invention, will appear more clearly from the following specification in conjunction with the accompanying schematic drawings, in which:

FIG. **1** is a top view of the upper portion of the housing of one exemplary embodiment of the inventive vacuum cleaning tool;

FIG. **2** is a cross-sectional view taken along the line II—II in FIG. **1**;

FIG. **3** is a cross-sectional view taken along the line III—III in FIG. **1**;

FIG. **4** is a view from below of the upper portion of the housing of FIG. **1**;

FIG. **5** is a cross-sectional view taken along the line V—V in FIG. **1**;

FIG. **6** is a plan view of the underside of the bottom portion of the housing of the vacuum cleaning tool;

FIG. **7** is a cross-sectional view taken along the line VII—VII in FIG. **6**;

FIG. **8** is a top view of a turbine chamber casing with an integral connector;

FIG. **9** is a cross-sectional view taken through the turbine chamber casing along the line IX—IX in FIG. **10**;

FIG. **10** is an axial cross-sectional view through the turbine casing of FIG. **8**;

FIG. **11** is a cross-sectional view through the vacuum cleaning tool at the level of the flow channel;

FIG. **12** is a further cross-sectional view through the vacuum cleaning tool at the level of the flow channel;

FIG. **13** is a cross-sectional view through the vacuum cleaning tool at the level of the wet intake channel;

FIG. **14** schematically illustrates a link member that is designed as a switching or control means;

FIG. **15** shows the configuration of the link member of FIG. **14**;

FIG. **16** is a side view of the link member of FIG. **15**;

FIG. **17** is a top view of a cover for forming the wet intake channel;

FIG. **18** is a view of the cover from below;

FIG. **19** is a view of the cover from the rear;

FIG. **20** is a cross-sectional view through the cover taken along the line XX—XX in FIG. **17**;

FIG. **21** is a cross-sectional view taken along the line XXI—XXI in FIG. **17**;

FIG. **22** is a view of an air turbine with mounting means on one side;

FIG. **23** is an axial cross-sectional view of the air turbine of FIG. **22**;

FIG. **24** is a top view of a cover plate;

FIG. **25** is a cross-sectional view through the cover plate taken along the line XXV—XXV in FIG. **24**; and

FIG. **26** is a view from below of the cover plate of FIG. **24**.

SUMMARY OF THE INVENTION

The vacuum cleaning tool of the present invention comprises: a housing having a base that is provided with at least one intake opening, the housing also having connector means for communicating with a vacuum line of a vacuum cleaning unit, wherein over the at least one intake opening there is provided in the housing a brush chamber in which is disposed a brush roller having bristles that project into the intake opening, the housing furthermore having a flow channel that connects the brush chamber to the connector means for an intake air stream, with a turbine chamber being disposed in the flow channel and accommodating an air turbine that is adapted to rotatably drive the brush roller, the housing also having a wet intake opening that is disposed approximately in a plane of the base of the housing, and the housing additionally being provided, parallel to the brush chamber and the flow channel, with a wet intake channel that connects the wet intake opening to the connector means; and respective controllable flow blocking means disposed in the wet intake channel and in the flow channel.

The wet intake channel, which is formed in particular between the upper portion of the housing and a cover part that can be secured to the housing, connects a wet intake opening provided in the plane of the housing base to the connector means of the vacuum cleaning tool, so that the intake opening, the brush chamber, and the flow channel to the connector means, and hence also the turbine chamber, are bypassed. There is thus provided a separate flow path for wet vacuuming procedures, thereby avoiding any adverse effects upon the flow paths for dry vacuuming. A flow blocking means is provided in the wet intake channel as well as in the flow channel, so that one or the other channel can be alternatively operated. The flow blocking means completely closes off the channel that is not required, so that no unwanted flow, whether wet or dry, occurs.

Advantageously, an auxiliary air channel that opens into the turbine chamber is provided parallel to the flow channel, with this auxiliary air channel being provided with a controllable flow blocking means so that in the dry mode either a flow of intake air with the brush rotating is available or just a rotating brush itself. A vacuum cleaning tool embodied in such a manner can be used in three entirely independent operating modes, namely brushing with an intake air stream (flow channel open), brushing without intake air stream (auxiliary air channel open), and wet vacuuming (wet intake channel open).

To ensure that when one of the channels is open the other channels are closed, the flow blocking means are interconnected in relative positions by a link member. Advantageously, such a link member has a control cam that is engaged by the free end of a control arm of the pertaining flow blocking means, which is designed as a flap. The cams are designed and physically arranged in conformity with the desired control positions.

The cover, which together with the upper portion of the housing forms the wet intake channel, can advantageously be clamped or clipped to the housing of the vacuum cleaning tool. In this way, the cover can be easily replaced by a cover plate that merely covers the transfer opening of the auxiliary air channel and the transfer opening of the wet intake channel that opens out at the upper portion of the housing.

Further specific features of the present invention will be described in detail subsequently.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawings in detail, the illustrated vacuum cleaning tool has a housing that is composed of an upper portion **1** (FIG. **1**) and a preferably hinged bottom portion **2** (FIG. **6**). As can be seen from the plan view of FIG. **1**, the upper portion **1** of the housing is essentially rectangular, with one long side forming the front face **3** of the vacuum cleaning tool and the other long side forming the rear **4** of the tool. A mounting or receiving means **6** is provided in the upper portion **1** of the housing; the receiving means **6** extends symmetrically relative to the transverse central axis **5** and is essentially open upwardly as well as toward the rear **4** of the vacuum cleaning tool. The receiving means **6** serves for the installation of a turbine chamber casing **30**, as shown in FIGS. **8** to **10**. The casing **30** essentially comprises a semi-cylinder **31** that is closed off at its axial ends by walls **32**. On the side opposite the opening **33**, the semi-cylinder **31** is connected to a funnel portion **34** that merges with a connector **35** for a vacuum hose of a non-illustrated vacuum cleaning unit. That edge **36** of the side walls **32** of the turbine chamber casing **30** that faces the opening **33** is rounded, with a step **37** being provided at the transition to the base portion **31***a* of the semi-cylinder **31**. This step **37** cooperates with a stop or abutment **79** of the housing (FIG. **11**) to limit the pivoting movement of the turbine chamber casing **30** in the receiving means **6**. Disposed in each side wall **32** is a slot **32***a* that extends in the direction of the longitudinal axis **38** and ends in a semi-circle **32***b* (FIG. **9**). The center point of the semi-circle **32***b* lies on the central axis **39** of the semi-cylinder **31**, which at the same time represents the axis of rotation of the turbine chamber casing **30** in the upper portion **1** of the housing, and also represents the axis of rotation of an air turbine that is disposed in the turbine chamber casing.

When viewed from above, the front long edge **33***a* of the base portion **31***a* of the semi-cylinder is disposed ahead of the long edge **33***b* of the cylinder portion **31***b* that forms the top. The opening **33**, which is delimited by the long edges **33***a* and **33***b* as well as by the edges **36** of the side walls **32**, has a height that is approximately equal to the diameter of the semi-cylinder **31** and is divided into a large inlet opening **41** and a small inlet opening **42** by a partition **40** that extends perpendicular to the central axis **39**. The large inlet opening **41** opens into the actual turbine chamber **43**, which is delimited by one of the axial side walls **32** and a partition **40**. The small inlet opening **42** forms a bypass channel **44** for the turbine chamber **43** for a reason to be discussed in detail subsequently.

Provided in the region where the funnel portion **34** is connected to the axial sidewalls **32** are mounting means **45***a* for non-illustrated securing screws or bolts.

The turbine chamber casing **30** is mounted in such a way in the receiving means **6** that it is pivotable about the axis **39**. Channels formed in the upper portion **1** of the housing are associated with the turbine chamber casing **30**. As can be seen in FIG. **1**, the opening **42** of the turbine chamber casing **30** that is installed in the receiving means **6** is disposed across from a transfer channel **45**, which is separated from a further transfer channel **47** by a partition **46**. As can be seen in particular from FIGS. **2** and **3**, the transfer channels **45** and **47** are disposed on the upper part of the housing facing the front face **3**. An extension **48** (FIG. **1**) of the partition **46** extends into the semi-cylindrical receiving means **6** so that when viewed in the axial direction, the extension **48** is aligned with the partition **40** when the turbine chamber casing **30** is installed.

Provided below the transfer channel **47** is a flow channel **10** (FIG. **3**) that starts at the brush chamber **7** and opens into the receiving means **6**. As shown in FIG. **3**, provided in the partition **46** is a vertical slot **49** that begins above the flow channel **10** and extends approximately to the bottom edge of the transfer channel **45** (see also FIG. **5**). The slot **49** serves for receiving control shafts **83**, **84**, **85** of flow blocking means **80**, **81**, **82** (FIG. **11**), which will be described in detail subsequently.

Parallel to the walls **6***a* and **6***b* of the receiving means **6**, the housing structure **7***a*, which is provided with the receiving means **6**, has grooves **8** and **9** that extend parallel to the transverse central axis **5**. Arresting openings **11** and **11***a* are provided in the bases of these grooves. The housing structure **7***a* is symmetrical to the transverse central axis **5**.

Longitudinal slots **15** are provided in the base **16** of the receiving means **6**, with the base **16** being inclined at an angle of approximately 15° to the horizontal. The longitudinal slots **15** are disposed adjacent to the axis of rotation **39** on both sides of the transverse central axis **5**.

On one side of the transverse central axis **5** an opening is disposed next to the housing structure **7***a*; an essentially rectangular rocker-type switch or switching means **12***a* is disposed in this opening. The switch or actuator **12***a* is pivotable about the axis **39** and has three positions, which will be described in detail subsequently.

The bottom view illustrated in FIG. **4** shows the brush chamber **7**, the axial ends of which are provided with mounting means **12** for rotatably supporting a brush roller **13**. One axial end of the brush roller **13** is provided with a belt pulley **14** that is driven by a belt,

preferably a toothed belt **17**, by a drive pulley **18**. The drive pulley **18** rotates about the central axis **39** and is driven by a drive shaft **21** (FIG. **22**) of an air turbine **19**, which at one axial end is mounted via the drive shaft in a hollow shaft **20** that is held in the housing. The axis of rotation of the air turbine **19** corresponds to the central axis **39**.

The base **16** of the upper portion **1** of the housing projects beyond the rear **4**. As can be seen from FIG. **4**, disposed in the corners between the base **16** and the rear **4** are respective wheel housings **29** for the rotatable mounting of non-illustrated wheels.

The bottom portion **2** of the housing shown in FIGS. **6** and **7** is secured to the upper portion **1** of the housing via screw domes **50** (FIG. **4**) into which are introduced fastening screws or similar securing means that pass through openings **51** provided in the bottom portion **2** of the housing. When viewed from above, the bottom portion **2** of the housing is essentially U-shaped, with the two legs **52** covering the upper portion of the housing laterally of the base **16**. A suction or intake opening **53** is formed in the bottom portion **2** of the housing, which forms the base; this opening extends at right angles to the transverse central axis **5** and essentially over the entire width of the vacuum cleaning tool. As schematically illustrated in FIGS. **11** to **13**, the bristles of the brush roller **13** project through the intake opening **53**. A respective U-shaped mounting means **54** is provided at each of the narrow sides of the lower portion **2** of the housing approximately at the level of the connection of the legs **52**; these mounting means serve for the rotatable mounting of further non-illustrated rollers that support the vacuum cleaning tool on the ground. Disposed between the two legs **52** is an extension **55** that, as shown in FIG. **11**, extends below the flow channel **10**. This ensures a tight connection between the bottom portion **2** and the upper portion **1** of the housing in the region of the flow channel **10**. It can also be advantageous to dispose a profiled rubber strip **103** (FIG. **11**) between the bottom edge of the front face **3** of the upper portion **1** of the housing and the edge of the bottom portion **2** of the housing. For sealing purposes, the cross-sectional configuration of the edge of the housing should expediently be designed to fit the rubber strip **103**.

As can be seen from the cross-sectional view of FIG. **7**, on the side facing the bottom portion **2** of the housing the legs **52** are provided with clamping means **56** that, as will be described in detail subsequently, on both sides of the receiving means **6** fit around the shafts **20** that are mounted in the upper portion **1** of the housing and are thereby securely clamped thereto. The clamping means **56** are indicated in FIG. **6**. Formed at the axial ends of the lower portion **2** of the housing are mounting covers **57** (FIG. **7**) that close off the mounting means **12** of the upper portion **1** of the housing.

FIGS. **11–13** show various cross-sectional views through the inventive vacuum cleaning tool in a direction parallel to the transverse central axis **5**. Secured to the upper portion **1** of the housing is a hood-like cover **60** which, as can be seen from the plan views of FIGS. **17** and **18**, is approximately T-shaped. As shown in FIGS. **20** and **21**, the foot of the T is angled off.

The hood-like cover **60** has a connecting portion **62**, the width of which is slightly greater than the receiving means **6**. The free end **63** (FIG. **17**) is provided at the sides with lugs or latches **61** that are designed as extensions of the side walls **64**. These side walls are designed to fit in the grooves **8** and **9** of the upper portion **1** of the housing (FIG. **1**), with the forward latches **61** extending into the arresting openings **11** that are adjacent to the central axis **39**. As shown in FIGS. **20** and **21**, the side walls are provided with further lugs or latches **61***a* that are designed to extend into the arresting openings **11***a* (FIG. **1**). Thus, the hood-like connecting portion **62** rests firmly upon the upper portion **1** of the housing and delimits or defines therewith a wet suction or intake channel **70** that extends from the receiving means **6** to the front face **3**. The channel **70** connects an opening **71**, which is disposed at the level **59** of the intake opening **53** in front of the front face **3**, with the transfer channel **45** that leads to the receiving means **6**. The opening **71** is delimited by the bottom edge of the front face **3** and, at the level **59** of the intake opening **53**, by the bottom edge of a vertical wall **65** that merges into the connecting portion **62**. That end of the portion **62** remote from the wall **65** has a roof or top part **66** that extends over the receiving means **6** and, when viewed from the top, ends just in front of the common axis of rotation **39**.

Connected to the opening **71** is a funnel portion **72** (FIG. **19**) that is formed between an inner wall **67** and the outer wall **65**. As part of the intake channel **70**, the funnel portion **72** reduces the cross-section available for flow to the passage of the connecting portion **62**, which corresponds approximately to the width of the receiving means **6**. As can be seen from the bottom view of FIG. **18**, disposed in the connecting portion **62**, approximately perpendicular to the transverse central axis **5**, is a Z-shaped sealing wall **68** that is designed as a double wall to accommodate a rubber seal. The sealing wall **68** rests against the upper portion **1** of the housing, thereby producing a region **69** that is separate from the wet intake channel **70** and is associated with the transfer opening or channel **47**. As shown in FIG. **17**, a plurality of openings **75** for auxiliary air are provided in the region **69** in the roof of the connecting portion **62** to allow ambient air to enter when the transfer channel **47** is open.

As can be seen in FIGS. **11** to **13**, a flow blocking means is disposed in the flow channel **10** that leads from the brush chamber **7** to the turbine chamber **43**. In the illustrated embodiment, the flow blocking means is in the form of a flap or similar closure means **80**. In a similar manner, a flow blocking means in the form of a flap **81** is associated with the transfer opening or channel **47**. Similarly, the transfer opening or channel **45** (FIG. **13**) can be closed off by a flow blocking means in the form of a flap **82**. Each of the flow blocking means, which are preferably in the form of flaps **80** to **82**, is fixedly connected to a control shaft **83** to **85** that is held in the upper portion of the housing parallel to the central axis or axis of rotation **39**. The three control shafts **83**, **84** and **85** are accommodated relatively tightly in the slot **86** in the partition **46**. Due to the closeness of the control shafts **83** and **84**, a sort of partition is formed that separates the transfer opening **47** (FIG. **11**) from the flow channel **10**. The cross-hatched part **58** of the housing illustrated in FIG. **11** can advantageously therefore be dispensed with, since its separating function is taken over by the two adjacent control shafts **83** and **84**.

The ends of the control shafts **83–85** that face the rocker-type switch **12***a* are each provided with a control arm **87**, **88** and **89**, the free ends **87***a*, **88***a* and **89***a* of which engage control cams **90** and **91**. In this connection, the free ends **87***a* and **88***a* of the control arms **87**

and **88** extend into a common, U-shaped control cam **90**, while the free end **89***a* of the control arm **89** extends into a separate, V-shaped control cam **91**. The control cams **90** and **91** are provided in a cam plate **92** that is pivotable about the axis of rotation **39**. The opening of the V of the V-shaped control cam **91** faces the axis of rotation **39**; the opening of the U of the U-shaped control cam **90** faces away from the axis of rotation **39**. The cam plate **92**, which is illustrated as a component in FIG. **15**, links the settings of the flaps **80** to **82** in conformity with the shape of the control cams **90** and **91**; the cam plate **92** thus forms a link member for the flaps **80** to **82**.

As shown in FIG. **16**, the cam plate **92** is reinforced by ribs **93** and **94** so that the rocker-type switch **12***a*, which protrudes out of the upper portion of the housing, can be fixedly secured to the link member **95**. By actuating the rocker-type switch **12***a*, for example with a foot, the cam plate **92** is pivoted out of the mid-position shown in FIG. **14** either in the direction of the arrow **96** or in the direction of the arrow **97**.

The arrangement is such that when the rocker-type switch **12***a* is in the mid-position, the cam plate **92** assumes the position shown in FIG. **14** in which the free end **89***a* of the control arm **89** is in the neutral low point of the V-shaped control cam **91**, and the free ends **87***a* and **88***a* of the control arms **87** and **88** are disposed in the neutral region of the cross-piece of the U-shaped control cam **90**. While in the neutral point of the control cam **91**, the flap **82** assumes the rest position shown in FIG. **13** in which the transfer opening **45** is clear, the flaps **80** and **81** (FIG. **11**) being in their operating positions in which the flow channel **10** and transfer opening **47** are closed. To compensate for measurement tolerances in the closed position, the outer end of the flap **80** can be bent in the shape of a quarter of a circle.

When the flap **82** of the wet intake channel **70** is in the illustrated rest position it lies in a recess **73** in the upper portion **1** of the housing, so that the open flap **82** does not restrict flow. The recess **73** is also shown in FIG. **2**.

If the cam plate **92** is pivoted in the direction of the arrow **97** by pressing the rocker-type switch **12** down, the free end **89***a* of the arm **89** moves into the end point **91***a* of the leg of the V-shaped cam, as a result of which the control shaft **89** rotates and the flap **82** assumes the operating position illustrated by dot-dashed lines in FIG. **13**, in which position the transfer opening **45** is closed. A stem **106** (FIG. **21**) is advantageously provided in the cover **60**, with the flap **82** resting against the step **106** in its operating position, thereby defining the closed position. The closing movement of the flap **82** is coupled with the movement of the free end **88***a* of the control arm **88** into the leg end **90***a* of the U-shaped cam **90**, as a result of which the control shaft **84** is pivoted and the transfer opening **47** is opened (FIGS. **11**, **12**). Similar to the recess **73**, a recess **74** is provided in the upper portion **1** of the housing for accommodating the flap **81** in its rest position. Since the free end **87***a* of the control arm **84** in this situation moves only in the neutral region of the control cam **90**, the control shaft **83** does not rotate.

If the rocker-type switch **12***a* is moved in the direction of the arrow **96**, the free end **89***a* of the control arm **89** moves into the end point **91***b* of the leg and the flap **82** again closes the transfer opening **45**, thereby blocking the wet intake channel. This control movement is coupled with the movement of the free end **87***a* of the control arm **87** into the leg end **90***b* of the control cam **90**, as a result of which the control shaft **83** rotates, thereby opening the flow channel **10**. To avoid any restriction of flow, the flap **80** is curved and rests flushly against a correspondingly curved portion of the wall of the brush chamber. The free end **88***a* of the control arm **88** remains in the neutral portion of the control cam **90**, so that the transfer opening **47** stays closed.

The link member **95** is fixedly connected to a collar **98**, and is preferably integrally formed with the collar. Disposed in the surface of the collar are arresting openings **99***a* to **99***c* that are engaged by a spring-loaded ball **100** that is held in the housing. When the ball **100** engages the arresting opening **99***b*, the mid-position of the rocker-type switch **12***a* is secured, with this mid-position corresponding to the position of the cam plate **92** shown in FIG. **14**. In this position, an air/liquid mixture flows into the vacuum cleaning tool only through the wet intake opening **71**, from where it is conveyed through the channel **70** past the brush chamber **7** and the flow channel **10** to the transfer opening **45**, from where it enters the bypass channel **44** (see FIG. **10**) of the turbine chamber housing. Since the bypass channel **44** bypasses the turbine chamber **43**, the air/liquid mixture flows directly out through the connector **35**.

When the ball **100** engages the arresting opening **99***a*, the flap **82** closes off the wet intake channel **70** while the transfer opening **47** is open, so that air flows to the turbine chamber **43** only via the auxiliary air openings **75** and the auxiliary air channel. This drives the air turbine **19** so that the brush roller **13** rotates. The vacuum cleaning tool can now be used for brushing. If the ball **100** engages the arresting opening **99***c*, the wet intake channel **70** is closed, the auxiliary air opening **47** is closed, and the flow channel **10** is now open, so that the brush roller **13** rotates in a normal manner and loosened or dissolved dirt enters the brush chamber **7** through the intake opening **53** and is carried off via the flow channel **10**, the turbine chamber **43**, and the connector **35**.

The association of the opening of the flow channel **10** into the turbine chamber **43**, the auxiliary air channel **47** into the turbine chamber, and the transfer of the wet intake channel **70** into the bypass channel **44**, is ensured no matter what the pivoted position of the turbine chamber casing **30** about the axis of rotation **39** since the turbine chamber is open over a peripheral angle of 180°. One side of the air turbine **19** that is disposed in the turbine chamber **43** is connected to the drive shaft **21**, which extends through the hollow shaft **20**. The drive shaft **21** is mounted in the hollow shaft **20** and at its free end **22**, which extends out of the hollow shaft **20**, carries the drive belt pulley **18**, which is preferably designed as a toothed belt pulley.

That end of the hollow shaft **20** that faces the air turbine **19** is provided with a bearing portion **23** that is rotatably held in the side wall **6***a* of the receiving means **6** (FIG. **1**). The bearing portion **23** is provided with a mounting flange **24** that is designed to match the slot **32***a* in the side wall **32** of the turbine chamber casing **30**. In a similar manner, a shaft is mounted in the side wall **6***a* of the receiving means **6** adjacent to the rocker-type switch **12***a* in such a way as to be rotatable about the central axis **39**. A non-illustrated mounting flange of this shaft fits into the slot **32***a* on the other side of the turbine chamber casing **30**. Opposite the mounting flange **24** and offset to the side is a screw flange **25** that, as illustrated by dot-dash lines in FIG. **10**, is disposed across from the mounting means **45***a* and is intended for a

securing bolt to fixedly connect the turbine chamber casing **30** to the upper portion **1** of the housing.

As indicated in FIG. **4**, that end of the air turbine **19** that is remote from the drive shaft **21** is disposed adjacent to the partition **40** (FIG. **10**). The air turbine **19** comprises a central disk **107**, on both sides of which are provided vanes **77**, **78** that extend at right angles to the disk **107**. The rings of vanes are offset relative to one another in the direction of rotation and are closed off by axial cover disks **108**, **109**.

As shown in FIGS. **24–26**, in place of the cover **60**, a cover plate **60'** can be provided that essentially comprises a roof or top part **66'** and an adjoining end portion **62'**. As can be seen in particular from FIG. **25**, a vertical end wall **145** is provided in the region of the transfer opening **45**, thereby forming a closed space in the region of the transfer opening **45**. The bypass channel **44** is thus closed off and no flow is possible through the bypass channel **44**.

That end of the portion **62'** remote from the top part **66'** is provided with a cutout **75'** via which auxiliary air can flow to the transfer opening **47**. Thus, if the cover plate **60'** is used, it is possible only to switch between the operating modes "brushing and vacuuming" and "brushing". If the vacuum cleaning tool is to be used predominantly for dry vacuuming, the cover **60** is replaced by the cover plate **60'**, so that the vacuum cleaning tool is physically smaller and is therefore more maneuverable.

The present invention is, of course, in no way restricted to the specific disclosure of the specification and drawings, but also encompasses any modifications within the scope of the appended claims.

What is claimed is:

1. A vacuum cleaning tool, comprising:

a housing having a base that is provided with at least one intake opening, said housing also having a connector means for connection to a vacuum line of a vacuum cleaning unit, wherein over and communicating with said at least one intake opening there is provided in said housing a brush chamber in which is disposed a brush roller having bristles that project out of said at least one intake opening, said housing furthermore having a flow channel that connects said brush chamber to said connector means, with a turbine chamber being disposed in said flow channel and accommodating an air turbine that is adapted to rotatably drive said brush roller, said tool also having a wet intake opening that is disposed approximately at a level of said base of said housing, and said tool additionally being provided parallel to said brush chamber and said flow channel, with a wet intake channel that connects said wet intake opening to said connector means;

respective controllable flow blocking means disposed in said wet intake channel and in said flow channel;

hood-like cover means disposed on said housing, said wet intake opening being formed by said cover means adjacent a front face of said housing approximately at a level of said at least one intake opening to said brush chamber, said cover means having a funnel portion that adjoins said wet intake opening and connects same to said wet intake channel; and

means for fixedly securing said cover means to said housing.

2. A vacuum cleaning tool according to claim **1**, wherein, parallel to said flow channel, said tool is provided with an auxiliary air channel that provides communication between outside air and said turbine chamber and that is provided with a further controllable flow blocking means.

3. A vacuum cleaning tool according to claim **2**, wherein said flow blocking means have an operating position in which they close off a pertaining channel and a rest position in which they open a pertaining channel.

4. A vacuum cleaning tool according to claim **2**, which includes a link member for connecting said flow blocking means in an interrelated manner.

5. A vacuum cleaning tool according to claim **4**, wherein each of said flow blocking means is a flap that is fixedly connected to a control shaft that is pivotable about a respective axis of rotation.

6. A vacuum cleaning tool according to claim **5**, wherein said link member is provided with control cam means for controlling positions of said flow blocking means, and wherein an end of each of said control shafts is provided with a respective control arm having a free end that engages said control cam means of said link member.

7. A vacuum cleaning tool according to claim **6**, wherein said control arm of said control shaft for said flap of said flow channel, and said control arm of said control shaft for said flap of said auxiliary air channel, engage a common control cam means.

8. A vacuum cleaning tool according to claim **5**, wherein said housing is provided with a common vertical slot for holding said control shafts of said flow blocking means one above the other.

9. A vacuum cleaning tool according to claim **4**, wherein said turbine chamber is provided in a turbine chamber casing that is integral with said connector means and is mounted in said housing so as to be pivotable about an axis of rotation.

10. A vacuum cleaning tool according to claim **9**, wherein said link member is also mounted in said housing so as to be pivotable about said axis of rotation.

11. A vacuum cleaning tool according to claim **10**, wherein said link member is fixedly connected to a rocker-type switching means that is disposed in an upper portion of said housing.

12. A vacuum cleaning tool according to claim **9**, wherein said air turbine has an axis of rotation that coincides with said axis of rotation of said turbine chamber casing.

13. A vacuum cleaning tool according to claim **4**, which includes means for arresting said link member in respective operating and rest positions of said flow blocking means.

14. A vacuum cleaning tool according to claim **1**, wherein said wet intake channel is formed between said cover means and an upper portion of said housing.

15. A vacuum cleaning tool according to claim **14**, wherein said wet intake opening is formed by said cover means and an edge of said housing disposed at said level of said at least one intake opening, said wet intake opening preferably having the same width as said at least one intake opening.

16. A vacuum cleaning tool according to claim **1**, which includes a turbine chamber casing that is disposed in said housing and is provided with a partition that divides said casing into said turbine chamber and a bypass channel that provides a bypass about said turbine chamber from said wet intake channel to said connector means.

17. A vacuum cleaning tool according to claim **1**, wherein only one axial end of said air turbine is mounted in said housing.

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